TITLE IV

RESEARCH, DEVELOPMENT, TEST AND EVALUATION

Funds appropriated under this title provide the resources required to conduct a program of research, development, test and evaluation, including research in basic science, applied research, advanced technology development, demonstration and validation, engineering and manufacturing development, and operational systems development.

The President's fiscal year 2020 budget requests a total of $102,647,545,000 for research, development, test and evaluation appropriations.

SUMMARY OF COMMITTEE ACTION

The Committee recommends research, development, test and evaluation appropriations totaling $104,282,139,000 for fiscal year 2020. This is $1,634,594,000 above the budget estimate.

Committee recommended research, development, test and evaluation appropriations for fiscal year 2020 are summarized below:

SUMMARY OF RESEARCH, DEVELOPMENT, TEST AND EVALUATION APPROPRIATIONS

[In thousands of dollars]

Account	2020 budget estimate	Committee recommendation	Change from budget estimate
Research, Development, Test and Evaluation:			
Research, Development, Test and Evaluation, Army	12,192,771	12,412,845	+220,074
Research, Development, Test and Evaluation, Navy	20,270,499	19,818,218	−452,281
Research, Development, Test and Evaluation, Air Force	45,616,122	45,446,727	−169,395
Research, Development, Test and Evaluation, Defense-Wide	24,346,953	26,371,649	+2,024,696
Operational Test and Evaluation, Defense	221,200	232,700	+11,500
Total	102,647,545	104,282,139	+1,634,594

REPROGRAMMING GUIDANCE FOR ACQUISITION ACCOUNTS

The Secretary of Defense is directed to continue to follow the reprogramming guidance as specified in the report accompanying the House version of the Department of Defense appropriations bill for fiscal year 2008 (House Report 110–279). Specifically, the dollar threshold for reprogramming funds will remain at $20,000,000 for procurement and $10,000,000 for research, development, test and evaluation.

Also, the Under Secretary of Defense (Comptroller) is directed to continue to provide the congressional defense committees quarterly, spreadsheet-based DD Form 1416 reports for service and defense-wide accounts in titles III and IV of this act. Reports for titles III and IV shall comply with guidance specified in the explanatory statement accompanying the Department of Defense Appropriations Act for Fiscal Year 2006. The Department shall continue to follow the limitation that prior approval reprogrammings are set at either the specified dollar threshold or 20 percent of the procurement or research, development, test and evaluation line, whichever is less. These thresholds are cumulative from the base for re-

programming value as modified by any adjustments. Therefore, if the combined value of transfers into or out of a procurement (P–1), or a research, development, test and evaluation (R–1) line exceeds the identified threshold, the Secretary of Defense must submit a prior approval reprogramming to the congressional defense committees. In addition, guidelines on the application of prior approval reprogramming procedures for congressional special interest items are established elsewhere in this report.

FUNDING INCREASES

The funding increases outlined in the tables for each appropriation account shall be provided only for the specific purposes indicated in the tables.

RESEARCH, DEVELOPMENT, TEST AND EVALUATION SPECIAL INTEREST ITEMS

Items for which additional funds have been recommended or items for which funding is specifically reduced as shown in the tables detailing Committee recommended adjustments or in paragraphs using the phrase "only for" or "only to" are congressional special interest items for the purpose of the Base for Reprogramming [DD Form 1414]. Each of these items must be carried on the DD Form 1414 at the stated amount, as specifically addressed in elsewhere in this report.

RESEARCH, DEVELOPMENT, TEST AND EVALUATION OVERVIEW

Basic Research.—The Committee understands that basic research is the foundation for Department of Defense innovation and future technologies. As the Under Secretary of Defense (Research and Engineering) has in the past testified before the Committee: "The Department of Defense has the third largest investment among Federal agencies in basic research at U.S. universities, who have, through years of continued investments, been the source of many of today's transformational technologies. Traditionally, the Department has viewed the role of universities as producing the research innovation, the Department of Defense labs as the mechanism to nurture these findings and to render them defense-applicable, and the defense industrial base to integrate these new technologies into acquisition programs." Accordingly, the Committee recommends an increase of $307,820,000 above the fiscal year 2020 budget request. This includes an additional $122,000,000 in Research, Development, Test and Evaluation, Army; $76,500,000 in Research, Development, Test and Evaluation, Navy; $50,000,000 in Research, Development, Test and Evaluation, Air Force; and $59,320,000 in Research, Development, Test and Evaluation, Defense-Wide.

Test and Evaluation Infrastructure for Technologies Critical to the National Defense Strategy.—House Report 115–952, the Joint Explanatory Statement of the Committee of Conference accompanying the Department of Defense Appropriations Act, 2019 directed the Under Secretary of Defense (Research and Engineering), in conjunction with the Director, Operational Test and Evaluation, and the Secretaries of the Army, Navy and Air Force, to conduct

an in-depth assessment of the Department of Defense test and evaluation infrastructure and to identify improvements required to address future warfighting capabilities. The Committee understands that the assessment discovered shortfalls in test and evaluation infrastructure of several technologies that are critical for implementing the 2018 National Defense Strategy, such as hypersonics, space, directed energy and cyber. Therefore, the Committee recommends an additional $235,250,000 in Research, Development, Test and Evaluation, Defense-Wide, program element 0604940D8Z, only for those purposes, as delineated in the accompanying table of Committee Recommended Adjustments.

The Committee directs that none of these funds may be obligated or expended until 30 days after the Under Secretary of Defense (Research and Engineering) provides a briefing to the congressional defense committees on the assessment requested in fiscal year 2019, as well as an execution plan developed, in conjunction with the Director, Operational Test and Evaluation, and the Secretaries of the Army, Navy and Air Force, for the additional funds recommended by the Committee.

Defense Industrial Base.—The Committee has reviewed the "Executive Order 13806 on Assessing and Strengthening the Manufacturing and Defense Industrial Base and Supply Chain Resiliency of the United States" report, which identified risks and challenges to a healthy and resilient defense industrial base. The Committee is encouraged by efforts led by the Under Secretary of Defense (Acquisition and Sustainment) to protect the defense industrial base in response to vulnerabilities identified in the 13806 report. Further, the Committee notes efforts by the Department of Defense to strengthen oversight of the Committee on Foreign Investment in the United States, which include expanding its jurisdiction in accordance with congressional direction. However, the Committee is concerned by the apparent lack of common visibility and coordination among the military services and the Under Secretary of Defense (Acquisition and Sustainment) regarding the supply chain for critical technologies that affect acquisition programs, to include the submarine industrial base; the modernization of nuclear command and control; and manufacturing efforts.

Therefore, the Committee recommends additional funds in Research, Development, Test and Evaluation, Defense-Wide for industrial base analysis and sustainment and directs the Deputy Secretary of Defense, in conjunction with the Under Secretary of Defense (Acquisition and Sustainment) and the Secretaries of the Army, Navy and Air Force, to submit to the congressional defense committees with the fiscal year 2021 President's budget the combined resource and policy strategy to address U.S. defense industrial base vulnerabilities.

Submarine Workforce Development.—The Committee notes the need to enhance the workforce pipeline for manufacturing in the defense sector for certain technical professions, including welding, pipefitting, electrical, machining, shipfitting, carpentry, and others specialties to support the 2018 National Defense Strategy. The Committee believes that expanding and improving the capability and capacity of the submarine industrial base workforce is critical to keep pace with current Navy shipbuilding programs. However,

the Committee is concerned that the Navy-certified welding workforce may be insufficient to meet Navy demands for the submarine build plan on time with the required quality. In particular, the Committee notes the current shortfall in the *Virginia* and *Columbia*-class technical workforce and supports increased submarine industrial base workforce training and education to address this shortfall. Therefore, the Committee recommends an increase of $8,000,000 in Research, Development, Test and Evaluation, Defense-Wide for submarine workforce development, and directs the Secretary of Defense to work with the Secretaries of Labor, Education, and Commerce to develop and implement a strategy for strengthening the workforce pipeline for critical defense industries, including new submarine construction.

Use of Research, Development, Test and Evaluation funding for Military Construction.—The fiscal year 2020 President's budget request includes $111,000,000 in research, development, test and evaluation [RDTE], Air Force funding to support three projects authorized by the Fiscal Year 2019 National Defense Authorization Act (Public Law 115–232) for the fiscal year 2017 Defense Laboratory Modernization Pilot Program. The Committee supports the three projects, but transfers the funding from the Defense appropriations bill to the Military Construction appropriations bill for more appropriate execution and oversight. The Committee understands the Department of Defense's challenge in prioritizing small, but critical laboratory construction projects with larger, higher profile construction projects. However, the Committee encourages the Department of Defense to appropriately request the funding in the Military Construction appropriations bill.

RESEARCH, DEVELOPMENT, TEST AND EVALUATION, ARMY

Appropriations, 2019	$11,083,824,000
Budget estimate, 2020	12,192,771,000
Committee recommendation	12,412,845,000

The Committee recommends an appropriation of $12,412,845,000. This is $220,074,000 above the budget estimate.

COMMITTEE RECOMMENDED PROGRAM

The following table summarizes the budget estimate for this appropriation, the Committee recommendation, and the Committee recommended adjustments to the budget estimate:

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
	RESEARCH, DEVELOPMENT, TEST & EVAL, ARMY			
	BASIC RESEARCH			
2	DEFENSE RESEARCH SCIENCES	297,976	391,976	+94,000
3	UNIVERSITY RESEARCH INITIATIVES	65,858	65,858	
4	UNIVERSITY AND INDUSTRY RESEARCH CENTERS	86,164	114,164	+28,000
5	CYBER COLLABORATIVE RESEARCH ALLIANCE	4,982	4,982	
	TOTAL, BASIC RESEARCH	454,980	576,980	+122,000
	APPLIED RESEARCH			
10	LETHALITY TECHNOLOGY	26,961	61,961	+35,000
11	ARMY APPLIED RESEARCH	25,319	25,319	
12	SOLDIER LETHALITY TECHNOLOGY	115,274	137,774	+22,500
13	GROUND TECHNOLOGY	35,199	137,699	+102,500
14	NEXT GENERATION COMBAT VEHICLE TECHNOLOGY	219,047	245,047	+26,000
15	NETWORK C3I TECHNOLOGY	114,516	140,016	+25,500
16	LONG RANGE PRECISION FIRES TECHNOLOGY	74,327	127,327	+53,000
17	FUTURE VERTICAL LIFT TECHNOLOGY	93,601	95,359	+1,758
18	AIR AND MISSILE DEFENSE TECHNOLOGY	50,771	90,771	+40,000
20	C3I APPLIED CYBER	18,947	18,947	
38	MANPOWER/PERSONNEL/TRAINING TECHNOLOGY	20,873	20,873	
40	MEDICAL TECHNOLOGY	99,155	101,155	+2,000
	TOTAL, APPLIED RESEARCH	893,990	1,202,248	+308,258
	ADVANCED TECHNOLOGY DEVELOPMENT			
42	MEDICAL ADVANCED TECHNOLOGY	42,030	52,030	+10,000
47	MANPOWER, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY	11,038	11,038	
50	ARMY ADVANCED TECHNOLOGY DEVELOPMENT	63,338	66,338	+3,000
51	SOLDIER LETHALITY ADVANCED TECHNOLOGY	118,468	129,468	+11,000
52	GROUND ADVANCED TECHNOLOGY	12,593	152,793	+140,200
59	C3I CYBER ADVANCED DEVELOPMENT	13,769	13,769	
60	HIGH PERFORMANCE COMPUTING MODERNIZATION PROGRAM	184,755	224,755	+40,000
61	NEXT GENERATION COMBAT VEHICLE ADVANCED TECHNOLOGY	160,035	222,035	+62,000
62	NETWORK C3I ADVANCED TECHNOLOGY	106,899	133,899	+27,000
63	LONG RANGE PRECISION FIRES ADVANCED TECHNOLOGY	174,386	189,386	+15,000
64	FUTURE VERTICAL LIFT ADVANCED TECHNOLOGY	151,640	148,892	−2,748
65	AIR AND MISSILE DEFENSE ADVANCED TECHNOLOGY	60,613	108,613	+48,000
	TOTAL, ADVANCED TECHNOLOGY DEVELOPMENT	1,099,564	1,453,016	+353,452
	DEMONSTRATION & VALIDATION			
73	ARMY MISSILE DEFENSE SYSTEMS INTEGRATION	10,987	62,487	+51,500
74	AIR AND MISSILE DEFENSE SYSTEMS ENGINEERING	15,148	70,148	+55,000
75	LANDMINE WARFARE AND BARRIER—ADV DEV	92,915	66,215	−26,700
77	TANK AND MEDIUM CALIBER AMMUNITION	82,146	77,696	−4,450
78	ARMORED SYSTEM MODERNIZATION—ADV DEV	157,656	129,756	−27,900
79	SOLDIER SUPPORT AND SURVIVABILITY	6,514	6,514	

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
80	TACTICAL ELECTRONIC SURVEILLANCE SYSTEM—AD	34,890	27,490	−7,400
81	NIGHT VISION SYSTEMS ADVANCED DEVELOPMENT	251,011	222,791	−28,220
82	ENVIRONMENTAL QUALITY TECHNOLOGY	15,132	19,561	+4,429
83	NATO RESEARCH AND DEVELOPMENT	5,406	5,406	.....
84	AVIATION—ADV DEV	459,290	447,940	−11,350
85	LOGISTICS AND ENGINEER EQUIPMENT—ADV DEV	6,254	6,254	.....
86	MEDICAL SYSTEMS—ADV DEV	31,175	36,175	+5,000
87	SOLDIER SYSTEMS—ADVANCED DEVELOPMENT	22,113	22,113	.....
88	ROBOTICS DEVELOPMENT	115,222	68,601	−46,621
90	ELECTRONIC WARFARE TECHNOLOGY MATURATION (MIP)	18,043	27,043	+9,000
91	ANALYSIS OF ALTERNATIVES	10,023	10,023	.....
92	FUTURE TACTICAL UNMANNED AIRCRAFT SYSTEM [FTUAS]	40,745	17,745	−23,000
93	LOWER TIER AIR MISSILE DEFENSE [LTAMID] SENSOR	427,772	379,772	−48,000
94	TECHNOLOGY MATURATION INITIATIVES	196,676	194,676	−2,000
95	MANEUVER—SHORT RANGE AIR DEFENSE [M-SHORAD]	33,100	35,400	+2,300
97	ARMY ADVANCED COMPONENT DEVELOPMENT & PROTOTYPING	115,116	112,806	−2,310
99	SYNTHETIC TRAINING ENVIRONMENT REFINEMENT AND PROTOTYPING	136,761	57,121	−79,640
100	HYPERSONICS	228,000	378,610	+150,610
102	FUTURE INTERCEPTOR	8,000	4,000	−4,000
103	UNIFIED NETWORK TRANSPORT	39,600	29,700	−9,900
104	MOBILE MEDIUM RANGE MISSILE	20,000	10,000	−10,000
106	CYBERSPACE OPERATIONS FORCES AND FORCE SUPPORT	52,102	42,202	−9,900
107	ASSURED POSITIONING, NAVIGATION AND TIMING [PNT]	192,562	136,110	−56,452
108	ARMY SPACE SYSTEMS INTEGRATION	104,996	104,996	.....
	TOTAL, DEMONSTRATION & VALIDATION	2,929,355	2,809,351	−120,004
	ENGINEERING & MANUFACTURING DEVELOPMENT			
109	AIRCRAFT AVIONICS	29,164	8,414	−20,750
110	ELECTRONIC WARFARE DEVELOPMENT	70,539	57,539	−13,000
113	INFANTRY SUPPORT WEAPONS	106,121	80,279	−25,842
114	MEDIUM TACTICAL VEHICLES	2,152	.....	−2,152
115	JAVELIN	17,897	14,997	−2,900
116	FAMILY OF HEAVY TACTICAL VEHICLES	16,745	13,125	−3,620
117	AIR TRAFFIC CONTROL	6,989	5,781	−1,208
118	LIGHT TACTICAL WHEELED VEHICLES	10,465	2,965	−7,500
119	ARMORED SYSTEMS MODERNIZATION [ASM]—ENG DEV	310,152	301,324	−8,828
120	NIGHT VISION SYSTEMS—SDD	181,732	156,537	−25,195
121	COMBAT FEEDING, CLOTHING, AND EQUIPMENT	2,393	2,393	.....
122	NON-SYSTEM TRAINING DEVICES—SDD	27,412	35,412	+8,000
123	AIR DEFENSE COMMAND, CONTROL AND INTELLIGENCE—SDD	43,502	23,502	−20,000
124	CONSTRUCTIVE SIMULATION SYSTEMS DEVELOPMENT	11,636	11,636	.....
125	AUTOMATIC TEST EQUIPMENT DEVELOPMENT	10,915	10,915	.....
126	DISTRIBUTIVE INTERACTIVE SIMULATIONS [DIS]—SDD	7,801	7,801	.....
127	BRILLIANT ANTI-ARMOR SUBMUNITION [BAT]	25,000	25,000	.....
128	COMBINED ARMS TACTICAL TRAINER [CATT] CORE	9,241	9,241	.....
129	BRIGADE ANALYSIS, INTEGRATION AND EVALUATION	42,634	42,634	.....
130	WEAPONS AND MUNITIONS—SDD	181,023	163,701	−17,322
131	LOGISTICS AND ENGINEER EQUIPMENT—SDD	103,226	100,826	−2,400
132	COMMAND, CONTROL, COMMUNICATIONS SYSTEMS—SDD	12,595	12,595	.....
133	MEDICAL MATERIEL/MEDICAL BIOLOGICAL DEFENSE EQUIPMENT	48,264	48,264	.....
134	LANDMINE WARFARE/BARRIER—SDD	39,208	39,208	.....
135	ARMY TACTICAL COMMAND & CONTROL HARDWARE & SOFTWARE	140,637	143,974	+3,337
136	RADAR DEVELOPMENT	105,243	95,720	−9,523
137	GENERAL FUND ENTERPRISE BUSINESS SYSTEM [GFEBS]	46,683	42,883	−3,800
138	FIREFINDER	17,294	17,294	.....
139	SOLDIER SYSTEMS—WARRIOR DEM/VAL	5,803	5,803	.....
140	SUITE OF SURVIVABILITY ENHANCEMENT SYSTEMS—EMD	98,698	85,198	−13,500
141	ARTILLERY SYSTEMS	15,832	15,832	.....
142	INFORMATION TECHNOLOGY DEVELOPMENT	126,537	55,689	−70,848
143	INTEGRATED PERSONNEL AND PAY SYSTEM-ARMY [IPPS-A]	142,773	92,073	−50,700
144	ARMORED MULTI-PURPOSE VEHICLE	96,730	83,830	−12,900

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
145	INTEGRATED GROUND SECURITY SURVEILLANCE RESPONSE CAPABILITY [IGSSR-C]	6,699	6,699	.....
146	JOINT TACTICAL NETWORK CENTER [JTNC]	15,882	15,882	.....
147	JOINT TACTICAL NETWORK [JTN]	40,808	40,808	.....
149	GROUND–BASED OPERATIONAL SURVEILLANCE SYSTEM—EXPENDITIONARY [GBOSS-E]	3,847	3,847	.....
150	TACTICAL SECURITY SYSTEM [TSS]	6,928	6,928	.....
151	COMMON INFRARED COUNTERMEASURES [CIRCM]	34,488	23,179	−11,309
152	COMBATING WEAPONS OF MASS DESTRUCTION [CWMD]	10,000	10,000	.....
154	NUCLEAR BIOLOGICAL CHEMICAL RECONNAISSANCE VEHICLE	6,054	6,054	.....
155	DEFENSIVE CYBER TOOL DEVELOPMENT	62,262	45,662	−16,600
156	TACTICAL NETWORK RADIO SYSTEMS (LOW-TIER)	35,654	29,254	−6,400
157	CONTRACT WRITING SYSTEM	19,682	17,082	−2,600
158	MISSILE WARNING SYSTEM MODERNIZATION [MWSM]	1,539	1,539	.....
159	AIRCRAFT SURVIVABILITY DEVELOPMENT	64,557	55,057	−9,500
160	INDIRECT FIRE PROTECTION CAPABILITY INC 2—BLOCK 1	243,228	236,428	−6,800
161	GROUND ROBOTICS	41,308	26,104	−15,204
162	EMERGING TECHNOLOGY INITIATIVES	45,896	12,996	−32,900
163	ARMY SYSTEM DEVELOPMENT & DEMONSTRATION	164,883	164,883	.....
165	JOINT AIR–TO–GROUND MISSILE [JAGM]	9,500	6,585	−2,915
166	ARMY INTEGRATED AIR AND MISSILE DEFENSE [AIAMD]	208,938	223,638	+14,700
167	MANNED GROUND VEHICLE	378,400	319,864	−58,536
168	NATIONAL CAPABILITIES INTEGRATION	7,835	7,835	.....
169	JOINT LIGHT TACTICAL VEHICLE ENG AND MANUFACTURING	2,732	7,232	+4,500
170	AVIATION GROUND SUPPORT EQUIPMENT	1,664	1,664	.....
172	TROJAN—RH12	3,936	3,936	.....
174	ELECTRONIC WARFARE DEVELOPMENT	19,675	15,232	−4,443
	TOTAL, ENGINEERING & MANUFACTURING DEVELOPMENT	3,549,431	3,100,773	−448,658
	RDT&E MANAGEMENT SUPPORT			
176	THREAT SIMULATOR DEVELOPMENT	14,117	59,117	+45,000
177	TARGET SYSTEMS DEVELOPMENT	8,327	28,327	+20,000
178	MAJOR T&E INVESTMENT	136,565	146,565	+10,000
179	RAND ARROYO CENTER	13,113	13,113	.....
180	ARMY KWAJALEIN ATOLL	238,691	238,691	.....
181	CONCEPTS EXPERIMENTATION PROGRAM	42,922	36,922	−6,000
183	ARMY TEST RANGES AND FACILITIES	334,468	361,468	+27,000
184	ARMY TECHNICAL TEST INSTRUMENTATION AND TARGETS	46,974	74,774	+27,800
185	SURVIVABILITY/LETHALITY ANALYSIS	35,075	35,075	.....
186	AIRCRAFT CERTIFICATION	3,461	3,461	.....
187	METEOROLOGICAL SUPPORT TO RDT&E ACTIVITIES	6,233	6,233	.....
188	MATERIEL SYSTEMS ANALYSIS	21,342	21,342	.....
189	EXPLOITATION OF FOREIGN ITEMS	11,168	11,168	.....
190	SUPPORT OF OPERATIONAL TESTING	52,723	52,723	.....
191	ARMY EVALUATION CENTER	60,815	60,815	.....
192	ARMY MODELING AND SIMULATION X-CMD COLLABORATION AND INTEG	2,527	2,527	.....
193	PROGRAMWIDE ACTIVITIES	58,175	58,175	.....
194	TECHNICAL INFORMATION ACTIVITIES	25,060	25,060	.....
195	MUNITIONS STANDARDIZATION, EFFECTIVENESS AND SAFETY	44,458	49,458	+5,000
196	ENVIRONMENTAL QUALITY TECHNOLOGY MGMT SUPPORT	4,681	4,681	.....
197	MANAGEMENT HEADQUARTERS (RESEARCH AND DEVELOPMENT)	53,820	53,820	.....
198	MILITARY GROUND-BASED CREW TECHNOLOGY	4,291	2,141	−2,150
199	RONALD REAGAN BALLISTIC MISSILE DEFENSE TEST SITE	62,069	62,069	.....
200	COUNTERINTEL AND HUMAN INTEL MODERNIZATION	1,050	1,050	.....
201	ASSESSMENTS AND EVALUATIONS CYBER VULNERABILITIES	4,500	4,500	.....
	TOTAL, RDT&E MANAGEMENT SUPPORT	1,286,625	1,413,275	+126,650
	OPERATIONAL SYSTEMS DEVELOPMENT			
204	MLRS PRODUCT IMPROVEMENT PROGRAM	22,877	19,877	−3,000
206	ANTI-TAMPER TECHNOLOGY SUPPORT	8,491	8,491	.....
207	WEAPONS AND MUNITIONS PRODUCT IMPROVEMENT PROGRAMS	15,645	15,645	.....

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
209	LONG RANGE PRECISION FIRES [LRPF]	164,182	164,182	
211	BLACKHAWK RECAP/MODERNIZATION	13,039	13,039	
212	CHINOOK HELICOPTER PRODUCT IMPROVEMENT PROGRAM	174,371	168,171	−6,200
213	FIXED WING AIRCRAFT	4,545		−4,545
214	IMPROVED TURBINE ENGINE PROGRAM	206,434	206,434	
216	AVIATION ROCKET SYSTEM PRODUCT IMPROVEMENT AND DEVELOPMENT	24,221	21,130	−3,091
217	UNMANNED AIRCRAFT SYSTEM UNIVERSAL PRODUCTS	32,016	18,132	−13,884
218	APACHE FUTURE DEVELOPMENT	5,448	5,448	
219	ARMY OPERATIONAL SYSTEMS DEVELOPMENT	49,526	45,026	−4,500
220	FAMILY OF BIOMETRICS	1,702	1,702	
221	PATRIOT PRODUCT IMPROVEMENT	96,430	63,630	−32,800
222	JOINT AUTOMATED DEEP OPERATION COORDINATION SYSTEM	47,398	47,398	
223	COMBAT VEHICLE IMPROVEMENT PROGRAMS	334,463	306,044	−28,419
225	155MM SELF-PROPELLED HOWITZER IMPROVEMENTS	214,246	199,274	−14,972
226	AIRCRAFT MODIFICATIONS/PRODUCT IMPROVEMENT PROGRAMS	16,486	13,778	−2,708
227	AIRCRAFT ENGINE COMPONENT IMPROVEMENT PROGRAM	144	144	
228	DIGITIZATION	5,270	5,270	
229	MISSILE/AIR DEFENSE PRODUCT IMPROVEMENT PROGRAM	1,287	1,287	
234	ENVIRONMENTAL QUALITY TECHNOLOGY—OPERATIONAL SYSTEM	732	10,000	+9,268
235	LOWER TIER AIR AND MISSILE DEFENSE [AMD] SYSTEM	107,746	99,746	−8,000
236	GUIDED MULTIPLE-LAUNCH ROCKET SYSTEM [GMLRS]	138,594	127,294	−11,300
238	SECURITY AND INTELLIGENCE ACTIVITIES	13,845	13,845	
239	INFORMATION SYSTEMS SECURITY PROGRAM	29,185	25,710	−3,475
240	GLOBAL COMBAT SUPPORT SYSTEM	68,976	48,376	−20,600
241	WWMCCS/GLOBAL COMMAND AND CONTROL SYSTEM	2,073	2,073	
245	INTEGRATED BROADCAST SERVICE [IBS]	459	459	
246	TACTICAL UNMANNED AERIAL VEHICLES	5,097	5,097	
247	AIRBORNE RECONNAISSANCE SYSTEMS	11,177	11,177	
248	DISTRIBUTED COMMON GROUND/SURFACE SYSTEMS	38,121	28,821	−9,300
250	RQ–11 UAV	3,218	3,218	
251	RQ–7 UAV	7,817	7,817	
252	BIOMETRICS ENABLED INTELLIGENCE	2,000	2,000	
253	END ITEM INDUSTRIAL PREPAREDNESS ACTIVITIES	59,848	98,348	+38,500
254	SATCOM GROUND ENVIRONMENT (SPACE)	34,169	34,169	
255	JOINT TACTICAL GROUND SYSTEM	10,275	7,677	−2,598
	TOTAL, OPERATIONAL SYSTEMS DEVELOPMENT	1,971,553	1,849,929	−121,624
9999	CLASSIFIED PROGRAMS	7,273	7,273	
	TOTAL, RESEARCH, DEVELOPMENT, TEST & EVAL, ARMY	12,192,771	12,412,845	+220,074

COMMITTEE RECOMMENDED ADJUSTMENTS

The following table details the adjustments recommended by the Committee:

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
2	Defense Research Sciences	297,976	391,976	+94,000
	Basic research program increase			+50,000
	Program increase: Advanced hemostat products			+15,000
	Program increase: Multi-fuel ignition, chemistry and control strategies for unmanned aircraft systems hybrid propulsion			+9,000
	Program increase: Transmission electron microscope			+20,000
4	University and Industry Research Centers	86,164	114,164	+28,000
	Program increase: Army artificial intelligence innovation institute			+6,000
	Program increase: Materials in extreme dynamic environments			+5,000

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
	Program increase: Catalyst			+10,000
	Program increase: Autonomous vehicles mobility			+5,000
	Program increase: University assisted hypervelocity testing			+2,000
10	Lethality Technology	26,961	61,961	+35,000
	Program increase: Multimission medium range railgun weapon system			+20,000
	Program increase: Mobile environment contaminant sensors			+5,000
	Program increase: Hybrid additive manufacturing			+10,000
12	Soldier Lethality Technology	115,274	137,774	+22,500
	Program increase: Active and passive camouflage, concealment and deception			+3,000
	Program increase: Human systems integration			+10,000
	Program increase: Expeditionary mobile base camp technology			+5,000
	Program increase: Harnessing emerging research opportunities to empower soldiers			+4,500
13	Ground Technology	35,199	137,699	+102,500
	Program increase: Materials manufacturing processes			+10,000
	Program increase: Highly durable advanced polymers for lightweight armor			+8,000
	Program increase: Cellulose nanocomposites research			+10,000
	Program increase: Countermine program			+5,000
	Program increase: Materials research			+17,500
	Program increase: Additive manufacturing and materials processing			+15,000
	Program increase: Cold weather military research			+3,000
	Program increase: Environmentally friendly coatings technology			+5,000
	Program increase: Sensing technologies for rapid hazard detection			+4,000
	Program increase: Cold spray technologies			+15,000
	Program increase: Center for research in extreme batteries			+10,000
14	Next Generation Combat Vehicle Technology	219,047	245,047	+26,000
	Program increase: Structural thermoplastics			+6,000
	Program increase: Advanced materials development for survivability			+10,000
	Program increase: Autonomous vehicle mobility			+10,000
15	Network C3I Technology	114,516	140,016	+25,500
	Program increase: Radioisotope power systems			+5,000
	Program increase: Anti-tamper technology development			+15,000
	Program increase: Next generation synthetic aperture radar			+5,500
16	Long Range Precision Fires Technology	74,327	127,327	+53,000
	Program increase			+20,000
	Program increase: Composite tube and propulsion prototyping			+20,000
	Program increase: Novel printed armament components			+13,000
17	Future Vertical Lift Technology	93,601	95,359	+1,758
	Restoring acquisition accountability: AI5 Next gen tactical UAS demo canceled			−9,242
	Program increase: Rotary wing adaptive flight control technology			+6,000
	Program increase: Technology transfer and innovation			+5,000
18	Air and Missile Defense Technology	50,771	90,771	+40,000
	Program increase: COE in high-energy laser and optical technology			+5,000

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
	Program increase: Cybersecurity and supply chain risk management			+15,000
	Program increase: High–energy laser hardware in the loop lab			+20,000
40	Medical Technology	99,155	101,155	+2,000
	Program increase: Safety and performance of female warfighters in extreme heat			+2,000
42	Medical Advanced Technology	42,030	52,030	+10,000
	Program increase: Peer-reviewed military burn research			+10,000
50	Army Advanced Technology Development	63,338	66,338	+3,000
	Program increase: Sensor and wireless communications denial capabilities			+3,000
51	Soldier Lethality Advanced Technology	118,468	129,468	+11,000
	Program increase: Rapid safe advanced materials			+6,000
	Program increase: Multi-spectral sensor mitigation			+5,000
52	Ground Advanced Technology	12,593	152,793	+140,200
	Program increase: Lead-acid battery life extension			+10,000
	Program increase: Anticipating threats to natural systems			+6,000
	Program increase: Robotic construction equipment			+9,700
	Program increase: Terrain conditions forecasting			+6,000
	Program increase: Environmental sensors for explosives			+3,000
	Program increase: Robotic 4-D printing of geopolymer–based composites			+2,000
	Program increase: Waste to energy disposal			+3,000
	Program increase: Advanced polymer development for force protection			+4,500
	Program increase: Micrometeorological-soil synthetic test environment			+2,000
	Program increase: Partnership and technology transfer			+5,000
	Program increase: Sensor systems for underground detection			+5,000
	Program increase: UAS mounted hostile threat detection			+5,000
	Program increase: Electrical system safety and reliability			+2,000
	Program increase: Infrastructure sustainment			+2,000
	Program increase: Army visual and tactical arctic reconnaissance			+2,000
	Program increase: Heavy load simulator			+6,000
	Program increase: Measurement and control of frozen surface properties			+4,000
	Program increase: Air–drop extended range munitions			+15,000
	Program increase: Resilient energy systems			+2,500
	Program increase: Urban subterranean mapping technology			+3,000
	Program increase: Operations in permafrost environment			+4,000
	Program increase: Power generation technologies in cold regions			+5,000
	Program increase: Sensing and prediction of arctic maritime coastal ice conditions			+5,000
	Program increase: Thermosyphons			+2,000
	Program increase. Materials and manufacturing technology for cold environments			+3,500
	Program increase: Energy technology research in cold and arctic regions			+4,000
	Program increase: Research facility modernization			+4,000
	Program increase: Lightweight airfield matting			+10,000
	Program increase: Coastal ice sensing			+5,000

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
60	High Performance Computing Modernization Program	184,755	224,755	+40,000
	Program increase			+40,000
61	Next Generation Combat Vehicle Advanced Technology	160,035	222,035	+62,000
	Program increase: Advanced high strength and lightweight steels			+3,000
	Program increase: Combat vehicle weight reduction initiative			+20,000
	Program increase: Virtual and physical prototyping			+10,000
	Program increase: HMMWV augmented reality system			+5,000
	Program increase: Health usage monitoring system for HMMWV			+3,000
	Program increase: HMMWV autonomy			+5,000
	Program increase: HMMWV torque monitoring			+2,000
	Program increase: HMMWV automotive enhancements			+10,000
	Program increase: Additive manufacturing			+4,000
62	Network C3I Advanced Technology	106,899	133,899	+27,000
	Program increase: Sensor advanced technology			+10,000
	Program increase: Assured position, navigation, and timing			+9,000
	Program increase: Payload and ground segment research and development for small satellite science and security applications			+8,000
63	Long Range Precision Fires Advanced Technology	174,386	189,386	+15,000
	Program increase: Missile rapid demonstration capability			+15,000
64	Future Vertical Lift Advanced Technology	151,640	148,892	−2,748
	Restoring acquisition accountability: AI6 Next gen tactical UAS demo canceled			−21,748
	Program increase: UAV fuel systems enhancements			+2,000
	Program increase: Surface tolerant advanced adhesives			+5,000
	Program increase: Ferrium steels for improved drive systems			+4,000
	Program increase: Stretch broken composite material forms			+8,000
65	Air and Missile Defense Advanced Technology	60,613	108,613	+48,000
	Program increase: Advanced explosion resistant window systems			+5,000
	Program increase: Silicon carbide power electronics packaging			+8,000
	Program increase: Enterprise science and technology demonstration prototyping			+10,000
	Program increase: High-energy laser development for all-terrain vehicles			+25,000
73	Army Missile Defense Systems Integration	10,987	62,487	+51,500
	Program increase: Conventional mission capabilities			+8,000
	Program increase: Hypersonic advanced technology testbed			+15,000
	Program increase: Integrated environmental control and power			+16,000
	Program increase: Pragmatic artificial intelligence and new technology laboratory			+12,500
74	Air and Missile Defense Systems Engineering	15,148	70,148	+55,000
	Program increase: Accelerating cyber and supply chain resiliency			+15,000
	Program increase: Artificial intelligence and machine learning			+20,000
	Program increase: Joint interoperability of integrated air and missile defense center			+20,000
75	Landmine Warfare and Barrier—Adv Dev	92,915	66,215	−26,700
	Restoring acquisition accountability: EK7 Area denial capability development contract delay			−26,700
77	Tank and Medium Caliber Ammunition	82,146	77,696	−4,450

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
	Restoring acquisition accountability: FG1 C–DAEM concurrency			−4,450
78	Armored System Modernization—Adv Dev	157,656	129,756	−27,900
	Improving funds management: Prior year carryover			−25,900
	Restoring acquisition accountability: Powertrain maturation efforts duplication			−2,000
80	Tactical Electronic Surveillance System—Adv Dev	34,890	27,490	−7,400
	Restoring acquisition accountability: Advanced miniaturized data acquisition system contract delay			−7,400
81	Night Vision Systems Advanced Development	251,011	222,791	−28,220
	Restoring acquisition accountability: BQ5 Capability set 3 unit cost growth			−5,220
	Improving funds management: BQ5 Funding carryover			−21,500
	Improving funds management: VT7 soldier maneuver sensors prior year carryover			−1,500
82	Environmental Quality Technology—Dem/Val	15,132	19,561	+4,429
	Improving funds management: Prior year carryover			−3,571
	Program increase: Biopolymers for military infrastructure			+3,000
	Program increase: Protective coatings			+5,000
84	Aviation—Adv Dev	459,290	447,940	−11,350
	Restoring acquisition accountability: FARA excess growth			−71,250
	Improving funds management: FARA excess funding for unawarded sixth vendor			−20,700
	Program increase: Future long-range assault aircraft			+75,600
	Program increase: University partnerships			+5,000
86	Medical Systems—Adv Dev	31,175	36,175	+5,000
	Program increase: Transport telemedicine technology			+5,000
88	Robotics Development	115,222	68,601	−46,621
	Restoring acquisition accountability: RCV phase 2 excess growth			−15,780
	Restoring acquisition accountability: RCV phase 2 test funding ahead of need			−3,726
	Restoring acquisition accountability: RCV phase 3 funding ahead of need			−27,115
90	Electronic Warfare Technology Maturation [MIP]	18,043	27,043	+9,000
	Program increase: Counter drone RF-signal based targeting			+9,000
92	Future Tactical Unmanned Aircraft System [FTUAS]	40,745	17,745	−23,000
	Restoring acquisition accountability: Air Launched Effects funding early to need			−15,000
	Restoring acquisition accountability: Multi Domain Task Force UAS demo delay			−8,000
93	Lower Tier Air Missile Defense [LTAMD] Sensor	427,772	379,772	−48,000
	Restoring acquisition accountability: Funds excess to requirement			−48,000
94	Technology Maturation Initiatives	196,676	194,676	−2,000
	Restoring acquisition accountability: AX6 Validation of APS layered protection funding ahead of need			−2,000
95	Maneuver—Short Range Air Defense (M–SHORAD)	33,100	35,400	+2,300
	Transfer from title IX			+6,000
	Improving funds management: Prior year carryover due to test delay			−3,700
97	Army Advanced Component Development & Prototyping	115,116	112,806	−2,310
	Classified adjustment			−2,310
99	Synthetic Training Environment Refinement & Prototyping	136,761	57,121	−79,640
	Improving funds management: SD6 Synthetic training environment prior year carryover			−20,000
	Restoring acquisition accountability: SV1 Soldier/squad virtual trainer funds excess to life cycle cost estimate			−59,640
100	Hypersonics	228,000	378,610	+150,610

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
	Program increase			+130,610
	Program increase: Hypersonic and strategic materials and structures center of excellence			+20,000
102	Future Interceptor	8,000	4,000	−4,000
	Restoring acquisition accountability: Funds excess to requirement			−4,000
103	Unified Network Transport	39,600	29,700	−9,900
	Improving funds management: Funds excess to requirement			−9,900
104	Mobile Medium Range Missile	20,000	10,000	−10,000
	Restoring acquisition accountability: Funds excess to requirement			−10,000
106	Cyberspace Operations Forces and Force Support	52,102	42,202	−9,900
	Improving funds management: Prior year carryover			−9,900
107	Assured Positioning, Navigation and Timing [PNT]	192,562	136,110	−56,452
	Restoring acquisition accountability: Pseudolites project terminated			−42,452
	Improving funds management: Excess growth			−14,000
109	Aircraft Avionics	29,164	8,414	−20,750
	Restoring acquisition accountability: Degraded visual environment lack of strategy			−14,500
	Improving funds management: Prior year carryover			−6,250
110	Electronic Warfare Development	70,539	57,539	−13,000
	mproving funds management: MFEW Phase II excess funding			−13,000
113	Infantry Support Weapons	106,121	80,279	−25,842
	Restoring acquisition accountability: FF2 Small Arms Fire Control legacy weapons excess funding			−12,163
	Restoring acquisition accountability: S63 excess new weapons systems development funding			−4,379
	Restoring acquisition accountability: S64 CROWS funding excess			−9,300
114	Medium Tactical Vehicles	2,152		−2,152
	Improving funds management: Prior year carryover			−2,152
115	JAVELIN	17,897	14,997	−2,900
	Restoring acquisition accountability: Lightweight CLU delays			−2,900
116	Family of Heavy Tactical Vehicles	16,745	13,125	−3,620
	Improving funds management: Prior year carryover			−3,620
117	Air Traffic Control	6,989	5,781	−1,208
	Improving funds management: Prior year carryover			−1,208
118	Light Tactical Wheeled Vehicles	10,465	2,965	−7,500
	Restoring acquisition accountability: HMMWV UAH recapitalization unjustified			−7,500
119	Armored Systems Modernization (ASM)—Eng Dev	310,152	301,324	−8,828
	Restoring acquisition accountability: Training aids and devices development ahead of need			−6,468
	Improving funds management: Program management carryover			−2,360
120	Night Vision Systems—Eng Dev	181,732	156,537	−25,195
	Restoring acquisition accountability: BQ6 Excess test funding			−4,500
	Improving funds management: BQ6 Funding carryover			−11,300
	Restoring acquisition accountability: L67 Enhanced Night Vision Goggle contract delay			−5,000
	Restoring acquisition accountability: L76 Lightweight Laser Designator Range Finder development funding excess to need			−2,995
	Improving funds management: L79 Joint Effects Targeting Systems prior year carryover			−1,400
122	Non-System Training Devices—Eng Dev	27,412	35,412	+8,000
	Program increase: RF threat emitters for Army combat training centers			+8,000

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
123	Air Defense Command, Control and Intelligence—Eng Dev	43,502	23,502	−20,000
	Restoring acquisition accountability: ALPS lack of strategy			−20,000
130	Weapons and Munitions—Eng Dev	181,023	163,701	−17,322
	Restoring acquisition accountability: S36 Precision guidance kit EMD delay			−12,850
	Restoring acquisition accountability: EU6 XM1113 EMD delay			−4,472
131	Logistics and Engineer Equipment—Eng Dev	103,226	100,826	−2,400
	Restoring acquisition accountability: EJ9 Maneuver support vessel light EMD delay			−7,400
	Restoring acquisition accountability: H02 Tactical bridging delays			−5,000
	Program increase: Mobile camouflage net systems			+10,000
135	Army Tactical Command & Control Hardware & Software	140,637	143,974	+3,337
	Improving funds management: EJ5 Mounted computing environment prior year carryover			−2,200
	Improving funds management: EJ6 Tactical enhancement prior year carryover			−1,853
	Restoring acquisition accountability: ER9 Command post integrated infrastructure contract delay			−6,610
	Program increase: Ultra-mobile remote ground terminal			+14,000
136	Radar Development	105,243	95,720	−9,523
	Improving funds management: Excess A4 growth and prior year carryover			−9,523
137	General Fund Enterprise Business System [GFEBS]	46,683	42,883	−3,800
	Improving funds management: GFEBS prior year carryover			−3,800
140	Suite of Survivability Enhancement Systems—EMD	98,698	85,198	−13,500
	Restoring acquisition accountability: FE8 Laser warning receiver efforts delayed			−5,000
	Restoring acquisition accountability: Abrams V3 test funding excess			−5,000
	Restoring acquisition accountability: Bradley delays			−8,500
	Program increase: Radar sensor technology			+5,000
142	Information Technology Development	126,537	55,689	−70,848
	Restoring acquisition accountability: Accessions information environment contract delay			−15,000
	Restoring acquisition accountability: HRC Accessioning IT unjustified request			−3,848
	Restoring acquisition accountability: Army training information system unjustified growth			−30,000
	Improving funds management: Prior year carryover			−22,000
143	Integrated Personnel and Pay System–Army (IPPS–A)	142,773	92,073	−50,700
	Improving funds management: Prior year carryover			−24,000
	Restoring acquisition accountability: Program delay due to change in strategy			−26,700
144	Armored Multi-Purpose Vehicle [AMPV]	96,730	83,830	−12,900
	Improving funds management: EMD carryover			−8,300
	Improving funds management: Program management excess			−4,600
151	Common Infrared Countermeasures [CIRCM]	34,488	23,179	−11,309
	Restoring acquisition accountability: Prototype manufacturing and S&T funding excess			−9,010
	Improving funds management: Test funding carryover			−2,299
155	Defensive CYBER Tool Development	62,262	45,662	−16,600
	Restoring acquisition accountability: Contract delays			−10,000
	Improving funds management: Excess growth			−6,600
156	Tactical Network Radio Systems (Low-Tier)	35,654	29,254	−6,400
	Improving funds management: Excess growth			−6,400
157	Contract Writing System	19,682	17,082	−2,600
	Improving funds management: Prior year carryover			−2,600

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
159	Aircraft Survivability Development	64,557	55,057	−9,500
	Restoring acquisition accountability: ER7 program delay			−9,500
160	Indirect Fire Protection Capability Inc 2—Block 1	243,228	236,428	−6,800
	Restoring acquisition accountability: Funds excess to requirement			−6,800
161	Ground Robotics	41,308	26,104	−15,204
	Restoring acquisition accountability: FB4 Common robotic system testing previously funded			−2,400
	Improving funds management: FB6 SMET excess to requirement			−12,804
162	Emerging Technology Initiatives	45,896	12,996	−32,900
	Restoring acquisition accountability: Optical augmentation program canceled			−2,100
	Insufficient budget justification: Unjustified request			−20,800
	Restoring acquisition accountability: Program management excess			−10,000
165	Joint Air-to-Ground Missile [JAGM]	9,500	6,585	−2,915
	Improving funds management: Funds excess to requirement			−2,915
166	Army Integrated Air and Missile Defense [AIAMD]	208,938	223,638	+14,700
	Improving funds management: Prior year carryover due to test delays			−15,300
	Program increase: Accelerated integration to counter emerging threats			+30,000
167	Manned Ground Vehicle	378,400	319,864	−58,536
	Restoring acquisition accountability: Excess funding ahead of finalized acquisition strategy			−82,250
	Restoring acquisition accountability: Program management excess			−15,964
	Restoring acquisition accountability: Test funding ahead of need			−7,822
	Program increase: XM–913 systems			+40,000
	Program increase: Tactical communications			+7,500
169	Joint Light Tactical Vehicle (JLTV) Engineering and Manufacturing Development Ph	2,732	7,232	+4,500
	Transfer: Army-requested transfer from OPA line 6			+4,500
174	Electronic Warfare Development	19,675	15,232	−4,443
	Improving funds management: Excess growth			−4,443
176	Threat Simulator Development	14,117	59,117	+45,000
	Program increase: Cyber threat and vulnerability assessments			+20,000
	Program increase: Cyber threat simulation enhancement initiative			+3,000
	Program increase: Cybersecurity operations center			+22,000
177	Target Systems Development	8,327	28,327	+20,000
	Program increase: UAS swarm threat and mitigation			+20,000
178	Major T&E Investment	136,565	146,565	+10,000
	Program increase: High-powered microwave test and evaluation assets			+10,000
181	Concepts Experimentation Program	42,922	36,922	−6,000
	Improving funds management: Excess growth			−6,000
183	Army Test Ranges and Facilities	334,468	361,468	+27,000
	Program increase: Distributed environment for system–of–system cybersecurity testing			+25,000
	Program increase: Soil research for Army training ranges			+2,000
184	Army Technical Test Instrumentation and Targets	46,974	74,774	+27,800
	Program increase: Cybersecurity of space and missile defense assets			+24,500
	Program increase: Expandable rotorcraft diagnostics			+3,300
195	Munitions Standardization, Effectiveness and Safety	44,458	49,458	+5,000
	Program increase: X–ray technologies			+5,000
198	Military Ground–Based CREW Technology	4,291	2,141	−2,150

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
	Improving funds management: Prior year carryover ...	.....	.....	−2,150
204	MLRS Product Improvement Program	22,877	19,877	−3,000
	Improving funds management: Prior year carryover ...	.....	.....	−3,000
212	Chinook Product Improvement Program	174,371	168,171	−6,200
	Restoring acquisition accountability: EMD unjustified growth	.....	.....	−10,000
	Restoring acquisition accountability: Program excess	.....	.....	−2,700
	Program increase: Block II lightweight improvements	.....	.....	+6,500
213	Fixed Wing Product Improvement Program	4,545	.....	−4,545
	Improving funds management: Prior year carryover ...	.....	.....	−4,545
216	Aviation Rocket System Product Improvement and Development	24,221	21,130	−3,091
	Improving funds management: Prior year carryover ...	.....	.....	−3,091
217	Unmanned Aircraft System Universal Products	32,016	18,132	−13,884
	Improving funds management: Prior year carryover ...	.....	.....	−13,884
219	Army Operational Systems Development	49,526	45,026	−4,500
	Classified adjustment	.....	.....	−4,500
221	Patriot Product Improvement	96,430	63,630	−32,800
	Restoring acquisition accountability: Excess growth ..	.....	.....	−32,800
223	Combat Vehicle Improvement Programs	334,463	306,044	−28,419
	Restoring acquisition accountability: Bradley improvements excess funding	.....	.....	−12,292
	Improving funds management: Bradley test funding carryover	.....	.....	−3,215
	Restoring acquisition accountability: Stryker ECP2 carryover	.....	.....	−10,200
	Improving funds management: Stryker program management carryover	.....	.....	−2,712
225	155mm Self–Propelled Howitzer Improvements	214,246	199,274	−14,972
	Restoring acquisition accountability: Funding excess to requirement	.....	.....	−4,972
	Improving funds management: Prior year carryover ...	.....	.....	−10,000
226	Aircraft Modifications/Product Improvement Programs	16,486	13,778	−2,708
	Improving funds management: Prior year carryover ...	.....	.....	−2,708
234	Environmental Quality Technology—Operational System Dev	732	10,000	+9,268
	Improving funds management: Prior year carryover ...	.....	.....	−732
	Program increase: Securing the availability of green, enhanced coatings	.....	.....	+10,000
235	Lower Tier Air and Missile Defense [AMD] System	107,746	99,746	−8,000
	Improving funds management: Prior year carryover ...	.....	.....	−8,000
236	Guided Multiple-Launch Rocket System [GMLRS]	138,594	127,294	−11,300
	Restoring acquisition accountability: Extended range development contract delay	.....	.....	−11,300
239	Information Systems Security Program	29,185	25,710	−3,475
	Restoring acquisition accountability: DV4 Next generation load device funding ahead of need	.....	.....	−1,500
	Improving funds management: DV5 Crypto modernization prior year carryover	.....	.....	−1,975
240	Global Combat Support System	68,976	48,376	−20,600
	Restoring acquisition accountability: Inc 2 contract delays	.....	.....	−14,100
	Restoring acquisition accountability: Inc 2 test funding ahead of need	.....	.....	−6,500
248	Distributed Common Ground/Surface Systems	38,121	28,821	−9,300
	Restoring acquisition accountability: CD2 contract delay	.....	.....	−6,300
	Improving funds management: Test funding excess growth	.....	.....	−3,000
253	End Item Industrial Preparedness Activities	59,848	98,348	+38,500
	Program increase: Power take-off hybridization	.....	.....	+7,000
	Program increase: Tungsten manufacturing affordability initiative for armaments	.....	.....	+10,000

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
	Program increase: Manufacturing technology program			+5,000
	Program increase: Transparent armor			+4,000
	Program increase: Nanoscale materials manufacturing			+12,500
255	Joint Tactical Ground System	10,275	7,677	−2,598
	Improving funds management: Prior year carryover			−2,598

Improved Turbine Engine Program.—The Committee understands that the Army is pursuing an Improved Turbine Engine Program [ITEP] that will deliver a next generation turbo-shaft engine for Future Attack Reconnaissance Aircraft [FARA] as well as current Black Hawk (H–60) and Apache (AH–64E) helicopter fleets. From its inception in fiscal year 2016, the ITEP program has experienced multiple delays, most recently a 1 month delay on the Engineering, Manufacturing, and Development contract followed by a 3 month delay due to a contract protest. The Committee understands that these delays have slowed the execution of funds and made a portion of the fiscal year 2020 President's budget request excess to need. However, the Committee also understands the importance of timing in ITEP development to ensure engines are available in fiscal year 2022 to meet the FARA flight test schedule. Therefore, the Committee recommends fully funding the fiscal year 2020 budget request and encourages the Army to maintain its current program schedule despite previous delays.

Medical Simulation Training.—The Committee supports development and expanded use of next generation, simulation-based medical training, which can improve readiness while reducing cost and increasing flexibility of where and when training is delivered. The Committee encourages the Army to make continued investments in the development and efficacy analysis of medical simulation training, tools, technologies, and techniques.

Carbon Fiber and Graphite Foam Technology.—The Committee understands that low-cost mesophase pitch carbon fiber and graphitic carbon foam components may reduce vehicle weight and fuel consumption, increase payload capacity, extend service life, reduce vehicle signatures, improve survivability, and utilize additive manufacturing technology to reduce cost in the Next Generation Combat Vehicle program and encourages the Army to continue efforts in this area.

RESEARCH, DEVELOPMENT, TEST AND EVALUATION, NAVY

Appropriations, 2019	$18,510,564,000
Budget estimate, 2020	20,270,499,000
Committee recommendation	19,818,218,000

The Committee recommends an appropriation of $19,818,218,000. This is $452,281,000 below the budget estimate.

COMMITTEE RECOMMENDED PROGRAM

The following table summarizes the budget estimate for this appropriation, the Committee recommendation, and the Committee recommended adjustments to the budget estimate:

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
	RESEARCH, DEVELOPMENT, TEST & EVAL, NAVY			
	BASIC RESEARCH			
1	UNIVERSITY RESEARCH INITIATIVES	116,850	137,850	+21,000
2	IN-HOUSE LABORATORY INDEPENDENT RESEARCH	19,121	19,121	
3	DEFENSE RESEARCH SCIENCES	470,007	525,507	+55,500
	TOTAL, BASIC RESEARCH	605,978	682,478	+76,500
	APPLIED RESEARCH			
4	POWER PROJECTION APPLIED RESEARCH	18,546	52,546	+34,000
5	FORCE PROTECTION APPLIED RESEARCH	119,517	202,517	+83,000
6	MARINE CORPS LANDING FORCE TECHNOLOGY	56,604	64,104	+7,500
7	COMMON PICTURE APPLIED RESEARCH	49,297	49,297	
8	WARFIGHTER SUSTAINMENT APPLIED RESEARCH	63,825	86,825	+23,000
9	ELECTROMAGNETIC SYSTEMS APPLIED RESEARCH	83,497	88,497	+5,000
10	OCEAN WARFIGHTING ENVIRONMENT APPLIED RESEARCH	63,894	82,082	+18,188
11	JOINT NON-LETHAL WEAPONS APPLIED RESEARCH	6,346	6,346	
12	UNDERSEA WARFARE APPLIED RESEARCH	57,075	93,075	+36,000
13	FUTURE NAVAL CAPABILITIES APPLIED RESEARCH	154,755	156,195	+1,440
14	MINE AND EXPEDITIONARY WARFARE APPLIED RESEARCH	36,074	48,074	+12,000
15	INNOVATIVE NAVAL PROTOTYPES [INP] APPLIED RESEARCH	153,062	165,385	+12,323
16	SCIENCE AND TECHNOLOGY MANAGEMENT—ONR HEADQUARTERS	73,961	73,961	
	TOTAL, APPLIED RESEARCH	936,453	1,168,904	+232,451
	ADVANCED TECHNOLOGY DEVELOPMENT			
17	FORCE PROTECTION ADVANCED TECHNOLOGY	35,286	35,286	
18	ELECTROMAGNETIC SYSTEMS ADVANCED TECHNOLOGY	9,499	9,499	
19	MARINE CORPS ADVANCED TECHNOLOGY DEMONSTRATION [ATD]	172,847	197,347	+24,500
20	JOINT NON-LETHAL WEAPONS TECHNOLOGY DEVELOPMENT	13,307	13,307	
21	FUTURE NAVAL CAPABILITIES ADVANCED TECHNOLOGY DEV	231,907	233,107	+1,200
22	MANUFACTURING TECHNOLOGY PROGRAM	60,138	65,138	+5,000
23	WARFIGHTER PROTECTION ADVANCED TECHNOLOGY	4,849	9,849	+5,000
25	NAVY WARFIGHTING EXPERIMENTS AND DEMONSTRATIONS	67,739	67,739	
26	MINE AND EXPEDITIONARY WARFARE ADVANCED TECHNOLOGY	13,335	13,335	
27	INNOVATIVE NAVAL PROTOTYPES [INP] ADVANCED TECHNOLOGY	133,303	136,003	+2,700
	TOTAL, ADVANCED TECHNOLOGY DEVELOPMENT	742,210	780,610	+38,400
	DEMONSTRATION & VALIDATION			
28	AIR/OCEAN TACTICAL APPLICATIONS	32,643	42,643	+10,000
29	AVIATION SURVIVABILITY	11,919	11,919	
30	AIRCRAFT SYSTEMS	1,473	1,473	
31	ASW SYSTEMS DEVELOPMENT	7,172	7,172	
32	TACTICAL AIRBORNE RECONNAISSANCE	3,419	3,419	
33	ADVANCED COMBAT SYSTEMS TECHNOLOGY	64,694	61,144	−3,550
34	SURFACE AND SHALLOW WATER MINE COUNTERMEASURES	507,000	148,600	−358,400
35	SURFACE SHIP TORPEDO DEFENSE	15,800	7,242	−8,558

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
36	CARRIER SYSTEMS DEVELOPMENT	4,997	4,997	
37	PILOT FISH	291,148	186,328	−104,820
38	RETRACT LARCH	11,980	11,980	
39	RETRACT JUNIPER	129,163	129,163	
40	RADIOLOGICAL CONTROL	689	689	
41	SURFACE ASW	1,137	1,137	
42	ADVANCED SUBMARINE SYSTEM DEVELOPMENT	148,756	116,604	−32,152
43	SUBMARINE TACTICAL WARFARE SYSTEMS	11,192	11,192	
44	SHIP CONCEPT ADVANCED DESIGN	81,846	81,846	
45	SHIP PRELIMINARY DESIGN & FEASIBILITY STUDIES	69,084	22,534	−46,550
46	ADVANCED NUCLEAR POWER SYSTEMS	181,652	181,652	
47	ADVANCED SURFACE MACHINERY SYSTEMS	25,408	157,408	+132,000
48	CHALK EAGLE	64,877	64,877	
49	LITTORAL COMBAT SHIP [LCS]	9,934	16,934	+7,000
50	COMBAT SYSTEM INTEGRATION	17,251	17,251	
51	OHIO REPLACEMENT PROGRAM	419,051	434,051	+15,000
52	LITTORAL COMBAT SHIP [LCS] MISSION MODULES	108,505	108,505	
53	AUTOMATED TEST AND RE-TEST	7,653	7,653	
54	FRIGATE DEVELOPMENT	59,007	59,007	
55	CONVENTIONAL MUNITIONS	9,988	9,988	
56	MARINE CORPS GROUND COMBAT/SUPPORT SYSTEM	86,464	70,264	−16,200
57	JOINT SERVICE EXPLOSIVE ORDNANCE DEVELOPMENT	33,478	33,478	
58	OCEAN ENGINEERING TECHNOLOGY DEVELOPMENT	5,619	5,619	
59	ENVIRONMENTAL PROTECTION	20,564	20,564	
60	NAVY ENERGY PROGRAM	26,514	43,014	+16,500
61	FACILITIES IMPROVEMENT	3,440	3,440	
62	CHALK CORAL	346,800	310,400	−36,400
63	NAVY LOGISTIC PRODUCTIVITY	3,857	3,857	
64	RETRACT MAPLE	258,519	192,019	−66,500
65	LINK PLUMERIA	403,909	396,509	−7,400
66	RETRACT ELM	63,434	63,434	
67	LINK EVERGREEN	184,110	184,110	
68	NATO RESEARCH AND DEVELOPMENT	7,697	7,697	
69	LAND ATTACK TECHNOLOGY	9,086	5,900	−3,186
70	JOINT NONLETHAL WEAPONS TESTING	28,466	28,466	
71	JOINT PRECISION APPROACH AND LANDING SYSTEMS	51,341	51,341	
72	DIRECTED ENERGY AND ELECTRIC WEAPON SYSTEMS	118,169	118,169	
73	F/A–18 INFRARED SEARCH AND TRACK [IRST]	113,456	113,456	
74	DIGITAL WARFARE OFFICE	50,120	40,120	−10,000
75	SMALL AND MEDIUM UNMANNED UNDERSEA VEHICLES	32,527	29,077	−3,450
76	UNMANNED UNDERSEA VEHICLE CORE TECHNOLOGIES	54,376	54,376	
77	RAPID PROTOTYPING, EXPERIMENTATION AND DEMONSTRATION	36,197	36,197	
78	LARGE UNMANNED UNDERSEA VEHICLES	68,310	68,310	
79	GERALD R. FORD CLASS NUCLEAR AIRCRAFT CARRIER	121,310	114,756	−6,554
80	LITTORAL AIRBORNE MCM	17,248	17,248	
81	SURFACE MINE COUNTERMEASURES	18,735	18,735	
82	TACTICAL AIR DIRECTIONAL INFRARED COUNTERMEASURES	68,346	68,346	
84	NEXT GENERATION LOGISTICS	4,420	14,420	+10,000
85	RAPID TECHNOLOGY CAPABILITY PROTOTYPE	4,558	4,558	
86	LX (R)	12,500	12,500	
87	ADVANCED UNDERSEA PROTOTYPING	181,967	201,967	+20,000
88	COUNTER UNMANNED AIRCRAFT SYSTEMS [C–UAS]	5,500	3,100	−2,400
89	PRECISION STRIKE WEAPONS DEVELOPMENT PROGRAM	718,148	688,148	−30,000
90	SPACE & ELECTRONIC WARFARE [SEW] ARCHITECTURE/ENGINE	5,263	5,263	
91	OFFENSIVE ANTI-SURFACE WARFARE WEAPON DEVELOPMENT	65,419	115,419	+50,000
92	ASW SYSTEMS DEVELOPMENT—MIP	9,991	9,991	
93	ADVANCED TACTICAL UNMANNED AIRCRAFT SYSTEM	21,157	45,407	+24,250
95	ELECTRONIC WARFARE DEVELOPMENT—MIP	609	609	
	TOTAL, DEMONSTRATION & VALIDATION	5,559,062	5,107,692	−451,370
	ENGINEERING & MANUFACTURING DEVELOPMENT			
96	TRAINING SYSTEM AIRCRAFT	15,514	15,514	
97	OTHER HELO DEVELOPMENT	28,835	38,835	+10,000

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
98	AV–8B AIRCRAFT—ENG DEV	27,441	27,441	
100	STANDARDS DEVELOPMENT	3,642	3,642	
101	MULTI-MISSION HELICOPTER UPGRADE DEVELOPMENT	19,196	19,196	
104	WARFARE SUPPORT SYSTEM	8,601	8,601	
105	TACTICAL COMMAND SYSTEM	77,232	77,232	
106	ADVANCED HAWKEYE	232,752	235,252	+2,500
108	H–1 UPGRADES	65,359	65,359	
109	ACOUSTIC SEARCH SENSORS	47,013	47,013	
110	V–22A	185,105	198,455	+13,350
111	AIR CREW SYSTEMS DEVELOPMENT	21,172	21,172	
112	EA–18	143,585	143,585	
113	ELECTRONIC WARFARE DEVELOPMENT	116,811	116,811	
114	EXECUTIVE HELO DEVELOPMENT	187,436	187,436	
116	NEXT GENERATION JAMMER [NGJ]	524,261	524,261	
117	JOINT TACTICAL RADIO SYSTEM—NAVY [JTRS–Navy]	192,345	192,345	
118	NEXT GENERATION JAMMER [NGJ] INCREMENT II	111,068	90,922	−20,146
119	SURFACE COMBATANT COMBAT SYSTEM ENGINEERING	415,625	375,875	−39,750
120	LPD–17 CLASS SYSTEMS INTEGRATION	640	640	
121	SMALL DIAMETER BOMB [SDB]	50,096	50,096	
122	STANDARD MISSILE IMPROVEMENTS	232,391	200,296	−32,095
123	AIRBORNE MCM	10,916	10,916	
124	NAVAL INTEGRATED FIRE CONTROL-COUNTER AIR SYSTEMS ENG	33,379	33,379	
125	ADVANCED ABOVE WATER SENSORS	34,554	34,554	
126	SSN–688 AND TRIDENT MODERNIZATION	84,663	84,663	
127	AIR CONTROL	44,923	44,923	
128	SHIPBOARD AVIATION SYSTEMS	10,632	14,632	+4,000
129	COMBAT INFORMATION CENTER CONVERSION	16,094	16,094	
130	AIR AND MISSILE DEFENSE RADAR [AMDR] SYSTEM	55,349	26,669	−28,680
131	ADVANCED ARRESTING GEAR [AAG]	123,490	123,490	
132	NEW DESIGN SSN	121,010	221,010	+100,000
133	SUBMARINE TACTICAL WARFARE SYSTEM	62,426	62,426	
134	SHIP CONTRACT DESIGN/LIVE FIRE T&E	46,809	46,809	
135	NAVY TACTICAL COMPUTER RESOURCES	3,692	3,692	
137	MINE DEVELOPMENT	28,964	76,464	+47,500
138	LIGHTWEIGHT TORPEDO DEVELOPMENT	148,349	93,249	−55,100
139	JOINT SERVICE EXPLOSIVE ORDNANCE DEVELOPMENT	8,237	8,237	
140	USMC GROUND COMBAT/SUPPORTING ARMS SYSTEMS—ENG DEV	22,000	22,000	
141	PERSONNEL, TRAINING, SIMULATION, AND HUMAN FACTORS	5,500	5,500	
142	JOINT STANDOFF WEAPON SYSTEMS	18,725	18,725	
143	SHIP SELF DEFENSE (DETECT & CONTROL)	192,603	178,603	−14,000
144	SHIP SELF DEFENSE (ENGAGE: HARD KILL)	137,268	121,630	−15,638
145	SHIP SELF DEFENSE (ENGAGE: SOFT KILL/EW)	97,363	97,363	
146	INTELLIGENCE ENGINEERING	26,710	46,710	+20,000
147	MEDICAL DEVELOPMENT	8,181	8,181	
148	NAVIGATION/ID SYSTEM	40,755	45,755	+5,000
149	JOINT STRIKE FIGHTER [JSF]—EMD	1,710	1,710	
150	JOINT STRIKE FIGHTER [JSF]	1,490	1,490	
153	INFORMATION TECHNOLOGY DEVELOPMENT	1,494	1,494	
154	INFORMATION TECHNOLOGY DEVELOPMENT	384,162	267,753	−116,409
155	ANTI–TAMPER TECHNOLOGY SUPPORT	4,882	4,882	
156	CH–53K	516,955	506,955	−10,000
158	MISSION PLANNING	75,886	75,886	
159	COMMON AVIONICS	43,187	43,187	
160	SHIP TO SHORE CONNECTOR [SSC]	4,909	19,909	+15,000
161	T–AO (X)	1,682	1,682	
162	UNMANNED CARRIER AVIATION	671,258	657,098	−14,160
163	JOINT AIR-TO-GROUND MISSILE [JAGM]	18,393	18,393	
165	MULTI-MISSION MARITIME AIRCRAFT [MMA]	21,472	21,472	
166	MULTI-MISSION MARITIME AIRCRAFT [MMA] INCREMENT 3	177,234	149,234	−28,000
167	MARINE CORPS ASSAULT VEHICLES SYSTEM DEVELOPMENT AND DEMO	77,322	50,222	−27,100
168	JOINT LIGHT TACTICAL VEHICLE [JLTV] SYSTEM DEVELOPMENT AND DEMO	2,105	2,105	

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
169	DDG–1000	111,435	111,435	.....
172	TACTICAL CRYPTOLOGIC SYSTEMS	101,339	101,339	.....
173	CYBER OPERATIONS TECHNOLOGY DEVELOPMENT	26,406	26,406	.....
	TOTAL, ENGINEERING & MANUFACTURING DEVELOPMENT	6,332,033	6,148,305	−183,728
	RDT&E MANAGEMENT SUPPORT			
174	THREAT SIMULATOR DEVELOPMENT	66,678	66,678	.....
175	TARGET SYSTEMS DEVELOPMENT	12,027	12,027	.....
176	MAJOR T&E INVESTMENT	85,348	85,348	.....
178	STUDIES AND ANALYSIS SUPPORT—NAVY	3,908	3,908	.....
179	CENTER FOR NAVAL ANALYSES	47,669	47,669	.....
180	NEXT GENERATION FIGHTER	20,698	5,100	−15,598
182	TECHNICAL INFORMATION SERVICES	988	988	.....
183	MANAGEMENT, TECHNICAL & INTERNATIONAL SUPPORT	102,401	122,401	+20,000
184	STRATEGIC TECHNICAL SUPPORT	3,742	3,742	.....
186	RDT&E SHIP AND AIRCRAFT SUPPORT	93,872	93,872	.....
187	TEST AND EVALUATION SUPPORT	394,020	394,020	.....
188	OPERATIONAL TEST AND EVALUATION CAPABILITY	25,145	25,145	.....
189	NAVY SPACE AND ELECTRONIC WARFARE [SEW] SUPPORT	15,773	15,773	.....
190	SEW SURVEILLANCE/RECONNAISSANCE SUPPORT	8,402	8,402	.....
191	MARINE CORPS PROGRAM WIDE SUPPORT	37,265	37,265	.....
192	MANAGEMENT HEADQUARTERS—R&D	39,673	39,673	.....
193	WARFARE INNOVATION MANAGEMENT	28,750	28,750	.....
196	INSIDER THREAT	2,645	2,645	.....
197	MANAGEMENT HEADQUARTERS (DEPARTMENTAL SUPPORT ACTIVITIES)	1,460	1,460	.....
	TOTAL, RDT&E MANAGEMENT SUPPORT	990,464	994,866	+4,402
	OPERATIONAL SYSTEMS DEVELOPMENT			
202	HARPOON MODIFICATIONS	2,302	2,302	.....
203	F–35 C2D2	422,881	358,367	−64,514
204	F–35 C2D2	383,741	325,199	−58,542
205	COOPERATIVE ENGAGEMENT CAPABILITY [CEC]	127,924	127,924	.....
207	STRATEGIC SUB & WEAPONS SYSTEM SUPPORT	157,676	119,766	−37,910
208	SSBN SECURITY TECHNOLOGY PROGRAM	43,354	43,354	.....
209	SUBMARINE ACOUSTIC WARFARE DEVELOPMENT	6,815	6,815	.....
210	NAVY STRATEGIC COMMUNICATIONS	31,174	31,174	.....
211	F/A–18 SQUADRONS	213,715	193,715	−20,000
213	SURFACE SUPPORT	36,389	36,389	.....
214	TOMAHAWK AND TOMAHAWK MISSION PLANNING CENTER [TMPC]	320,134	226,234	−93,900
215	INTEGRATED SURVEILLANCE SYSTEM	88,382	100,382	+12,000
216	SHIP-TOWED ARRAY SURVEILLANCE SYSTEMS	14,449	14,449	.....
217	AMPHIBIOUS TACTICAL SUPPORT UNITS	6,931	6,931	.....
218	GROUND/AIR TASK ORIENTED RADAR	23,891	28,891	+5,000
219	CONSOLIDATED TRAINING SYSTEMS DEVELOPMENT	129,873	129,873	.....
221	ELECTRONIC WARFARE [EW] READINESS SUPPORT	82,325	82,325	.....
222	HARM IMPROVEMENT	138,431	129,829	−8,602
224	SURFACE ASW COMBAT SYSTEM INTEGRATION	29,572	29,572	.....
225	MK–48 ADCAP	85,973	85,973	.....
226	AVIATION IMPROVEMENTS	125,461	125,461	.....
227	OPERATIONAL NUCLEAR POWER SYSTEMS	106,192	106,192	.....
228	MARINE CORPS COMMUNICATIONS SYSTEMS	143,317	147,707	+4,390
229	COMMON AVIATION COMMAND AND CONTROL SYSTEM	4,489	4,489	.....
230	MARINE CORPS GROUND COMBAT/SUPPORTING ARMS SYSTEMS	51,788	51,788	.....
231	MARINE CORPS COMBAT SERVICES SUPPORT	37,761	45,761	+8,000
232	USMC INTELLIGENCE/ELECTRONIC WARFARE SYSTEMS (MIP)	21,458	27,886	+6,428
233	AMPHIBIOUS ASSAULT VEHICLE	5,476	5,476	.....
234	TACTICAL AIM MISSILES	19,488	19,488	.....
235	ADVANCED MEDIUM RANGE AIR–TO–AIR MISSILE [AMRAAM]	39,029	39,029	.....
239	SATELLITE COMMUNICATIONS (SPACE)	34,344	34,344	.....
240	CONSOLIDATED AFLOAT NETWORK ENTERPRISE SERVICES	22,873	22,873	.....
241	INFORMATION SYSTEMS SECURITY PROGRAM	41,853	46,353	+4,500

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
243	JOINT MILITARY INTELLIGENCE PROGRAMS	8,913	8,913	
244	TACTICAL UNMANNED AERIAL VEHICLES	9,451	9,451	
245	UAS INTEGRATION AND INTEROPERABILITY	42,315	42,315	
246	DISTRIBUTED COMMON GROUND SYSTEMS/SURFACE SYSTEMS	22,042	22,042	
248	MQ–4C TRITON	11,784	11,784	
249	MQ–8 UAV	29,618	29,618	
250	RQ–11 UAV	509	509	
251	SMALL (LEVEL 0) TACTICAL UAS [STUASL0]	11,545	11,545	
252	RQ–21A	10,914	10,914	
253	MULTI–INTELLIGENCE SENSOR DEVELOPMENT	70,612	70,612	
254	UNMANNED AERIAL SYSTEMS [UAS] PAYLOADS (MIP)	3,704	10,004	+6,300
255	RQ–4 MODERNIZATION	202,346	185,446	−16,900
256	MODELING AND SIMULATION SUPPORT	7,119	7,119	
257	DEPOT MAINTENANCE (NON-IF)	38,182	48,182	+10,000
258	MARITIME TECHNOLOGY [MARITECH]	6,779	26,779	+20,000
259	SATELLITE COMMUNICATIONS (SPACE)	15,868	15,868	
	TOTAL, OPERATIONAL SYSTEMS DEVELOPMENT	3,491,162	3,267,412	−223,750
9999	CLASSIFIED PROGRAMS	1,613,137	1,667,951	+54,814
	TOTAL, RESEARCH, DEVELOPMENT, TEST & EVAL, NAVY	20,270,499	19,818,218	−452,281

COMMITTEE RECOMMENDED ADJUSTMENTS

The following table details the adjustments recommended by the Committee:

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
1	University Research Initiatives	116,850	137,850	+21,000
	Program increase: University research initiatives			+5,000
	Program increase: Advanced digital radars			+8,000
	Program increase: Aircraft fleet readiness and sustainment			+8,000
3	Defense Research Sciences	470,007	525,507	+55,500
	Program increase: Navy ROTC cybersecurity training program			+5,500
	Basic research program increase			+50,000
4	Power Projection Applied Research	18,546	52,546	+34,000
	Program increase: Microwave systems for counter–UAS defense			+14,000
	Program increase: Hypersonic testing and related technology development			+20,000
5	Force Protection Applied Research	119,517	202,517	+83,000
	Program increase: Lithium–ion battery safety and performance improvements			+3,000
	Program increase: Electric propulsion for military craft and advanced planing hulls			+8,500
	Program increase: Hybrid composite structures research for enhanced mobility			+5,000
	Program increase: Test bed for autonomous ship systems			+8,000
	Program increase: Talent and technology for Navy power and energy systems			+9,500
	Program increase: Compact high flow fan			+4,000
	Program increase: Network cyber security and resiliency			+4,000
	Program increase: Navy alternative energy research, development, testing and deployment			+20,000
	Program increase: Data-model fusion for naval platforms and systems			+5,000
	Program increase: Energy resilience			+8,000

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
	Program increase: Blue carbon capture/direct air capture			+8,000
6	Marine Corps Landing Force Technology	56,604	64,104	+7,500
	Program increase: Interdisciplinary expeditionary cybersecurity research			+7,500
8	Warfighter Sustainment Applied Research	63,825	86,825	+23,000
	Program increase: Laser peening technology			+4,000
	Program increase: Lightweight anti-corrosion nanotechnology coating enhancement			+5,000
	Program increase: Polymer coatings for reduced ice and fouling adhesion			+6,000
	Program increase: Undersea domain human performance requirements			+3,000
	Program increase: Engineered systems to prevent hearing loss			+5,000
9	Electromagnetic Systems Applied Research	83,497	88,497	+5,000
	Program increase: Electromagnetic systems applied research			+5,000
10	Ocean Warfighting Environment Applied Research	63,894	82,082	+18,188
	Improving funds management: Unjustified growth			−3,812
	Program increase: Naval special warfare			+10,000
	Program increase: Arctic geospatial information			+5,000
	Program increase: Task Force Ocean			+7,000
12	Undersea Warfare Applied Research	57,075	93,075	+36,000
	Program increase: Navy and academia submarine partnerships			+10,000
	Program increase: Machine discovery and invention			+4,000
	Program increase: Instrumented tow cable			+5,000
	Program increase: Navy undersea warfare science and technology strategy			+2,000
	Program increase: Energetics technology			+8,000
	Program increase: Autonomous undersea robotics sytems			+7,000
13	Future Naval Capabilities Applied Research	154,755	156,195	+1,440
	Improving funds management: Advanced analytics and decision making unjustified growth			−2,560
	Program increase: C4ISR and special projects			+4,000
14	Mine and Expeditionary Warfare Applied Research	36,074	48,074	+12,000
	Program increase: Underwater mine defeat capabilities urgent operational need			+12,000
15	Innovative Naval Prototypes [INP] Applied Research	153,062	165,385	+12,323
	Restoring acquisition accountability: MDUSV program of record maturation			−1,677
	Program increase: Thermoplastic carbon-fiber composite materials research			+4,000
	Program increase: Thermoplastic tailorable universal feedstock composites			+10,000
19	USMC Advanced Technology Demonstration [ATD]	172,847	197,347	+24,500
	Program increase: Robotic protection system			+5,000
	Program increase: Expeditionary mission planning enabled by high fidelity simulation			+10,000
	Program increase: Extended range 155mm projectile			+2,500
	Program increase: Adaptive threat force			+7,000
21	Future Naval Capabilities Advanced Technology Development	231,907	233,107	+1,200
	Program increase: Automated critical care system			+1,200
22	Manufacturing Technology Program	60,138	65,138	+5,000
	Program increase: Modern shipbuilding manufacturing			+5,000
23	Warfighter Protection Advanced Technology	4,849	9,849	+5,000
	Program increase: Novel therapeutic intervention			+5,000
27	Innovative Naval Prototypes [INP] Advanced Technology Development	133,303	136,003	+2,700
	Improving funds management: Funds excess to requirements			−12,300
	Program increase: Advanced thermal and power technology for improved DEW SWAP			+15,000
28	Air/Ocean Tactical Applications	32,643	42,643	+10,000

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
	Program increase: Long duration autonomous hydrographic survey			+10,000
33	Advanced Combat Systems Technology	64,694	61,144	−3,550
	Restoring acquisition accountability: Project 3422 unit cost growth and excessive continuous prototyping			−3,550
34	Surface and Shallow Water Mine Countermeasures	507,000	148,600	−358,400
	Restoring acquisition accountability: Project 3066 transfer USV procurement to Shipbuilding and Conversion, Navy			−209,200
	Restoring acquisition accountability: Project 3066 LUSV VLS concept design			−70,000
	Restoring acquisition accountability: Project 3066 transfer USV C4 LLTM procurement to Shipbuilding and Conversion, Navy			−39,200
	Restoring acquisition accountability: Project 3066 VLS LLTM early to need			−40,000
35	Surface Ship Torpedo Defense	15,800	7,242	−8,558
	Restoring acquisition accountability: Excess sundown costs			−8,558
37	PILOT FISH	291,148	186,328	−104,820
	Program adjustment			−104,820
42	Advanced Submarine System Development	148,756	116,604	−32,152
	Restoring acquisition accountability: Project 2096 material purchases growth early to need			−3,135
	Restoring acquisition accountability: Project 9710 lack of acquisition strategies			−29,017
45	Ship Preliminary Design & Feasibility Studies	69,084	22,534	−46,550
	Restoring acquisition accountability: Project 0411 FSC concept development early to need			−46,550
47	Advanced Surface Machinery Systems	25,408	157,408	+132,000
	Program increase: Silicon carbide electronics systems			+7,000
	Program increase: Surface combatant component–level prototyping			+125,000
49	Littoral Combat Ship [LCS]	9,934	16,934	+7,000
	Program increase: Integrated fire control land–based test asset			+7,000
51	Ohio Replacement	419,051	434,051	+15,000
	Program increase: Materials for submarine propulsor applications			+15,000
56	Marine Corps Ground Combat/Support System	86,464	70,264	−16,200
	Restoring acquisition accountability: Project 1558 prototype manufacturing early to need			−6,000
	Restoring acquisition accountability: Project 7400 Sea Mob Amphibious Reconnaissance Capability product development			−10,200
60	Navy Energy Program	26,514	43,014	+16,500
	Program increase: Marine energy systems for sensors and microgrids			+11,500
	Program increase: Navy energy program/shore energy			+5,000
62	CHALK CORAL	346,800	310,400	−36,400
	Program adjustment			−36,400
64	RETRACT MAPLE	258,519	192,019	−66,500
	Program adjustment			−66,500
65	LINK PLUMERIA	403,909	396,509	−7,400
	Program adjustment			−7,400
69	Land Attack Technology	9,086	5,900	−3,186
	Restoring acquisition accountability: Project 3401 lack of acquisition strategy			−3,186
74	Digital Warfare Office	50,120	40,120	−10,000
	Restoring acquisition accountability: Artificial intelligence development operations unjustified growth			−10,000
75	Small and Medium Unmanned Undersea Vehicles	32,527	29,077	−3,450
	Project 3123 improving funds management: Delay and Block II concurrency			−3,450

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
79	Gerald R. Ford Class Nuclear Aircraft Carrier (CVN 78–80)	121,310	114,756	−6,554
	Improving funds management: Revised test schedule			−6,554
84	Next Generation Logistics	4,420	14,420	+10,000
	Program increase: Large–scale 3D printing robotic system			+10,000
87	Advanced Undersea Prototyping	181,967	201,967	+20,000
	Program increase: XLUUV competitive risk reduction			+20,000
88	Counter Unmanned Aircraft Systems [C–UAS]	5,500	3,100	−2,400
	Reduce duplication: System development			−2,400
89	Precision Strike Weapons Development Program	718,148	688,148	−30,000
	Restoring acquisition accountability: Project 3334 acquisition and contract strategy			−30,000
91	Offensive Anti–Surface Warfare Weapon Development	65,419	115,419	+50,000
	Program increase: LRASM 1.1 capability improvements			+50,000
93	Advanced Tactical Unmanned Aircraft System	21,157	45,407	+24,250
	Restoring acquisition accountability: Project 3135 acquisition and funding strategy			−8,250
	Program increase: Large unmanned logistics systems—air development			+18,500
	Program increase: Secure and resilient battlefield networking capabilities			+14,000
97	Other Helo Development	28,835	38,835	+10,000
	Program increase: Attack and utility replacement aircraft			+10,000
106	Advanced Hawkeye	232,752	235,252	+2,500
	Restoring acquisition accountability: DSSC–6			−9,500
	Program increase: E–2D Hawkeye radar			+12,000
110	V–22A	185,105	198,455	+13,350
	Program increase: Active vibration control system			+5,000
	Program increase: Common lightweight cargo system			+8,350
118	Next Generation Jammer [NGJ] Increment II	111,068	90,922	−20,146
	Restoring acquisition accountability: Change in acquisition strategy			−20,146
119	Surface Combatant Combat System Engineering	415,625	375,875	−39,750
	Restoring acquisition accountability: AEGIS BL 9 unjustified scope expansion			−39,750
122	Standard Missile Improvements	232,391	200,296	−32,095
	Restoring acquisition accountability: Project 2063 contract award delays			−39,095
	Program increase: Advanced carbon nanotube materials research			+7,000
128	Shipboard Aviation Systems	10,632	14,632	+4,000
	Program increase: Aircraft launch and recovery equipment software improvements			+4,000
130	Air and Missile Defense Radar [AMDR] System	55,349	26,669	−28,680
	Restoring acquisition accountability: Advanced distributed radar development and integration concurrency			−28,680
132	New Design SSN	121,010	221,010	+100,000
	Restoring acquisition accountability: Transfer from Shipbuilding and Conversion, Navy line 3, SSN–812 for SSN–812 design risk reduction			+100,000
137	Mine Development	28,964	76,464	+47,500
	Program increase: Quick strike joint direct attack munition			+47,500
138	Lightweight Torpedo Development	148,349	93,249	−55,100
	Improving funds management: Project 3418 program delays			−55,100
143	Ship Self Defense (Detect & Control)	192,603	178,603	−14,000
	Project 2178: CSEA contract award delays			−14,000
144	Ship Self Defense (Engage: Hard Kill)	137,268	121,630	−15,638
	Restoring acquisition accountability: Project 2070 excess test assets			−15,638
146	Intelligence Engineering	26,710	46,710	+20,000
	Program increase: Command and control satellite systems cyber security			+20,000

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
148	Navigation/ID System	40,755	45,755	+5,000
	Program increase: Development of lightweight security identification Friend or Foe transmitter			+5,000
154	Information Technology Development	384,162	267,753	−116,409
	Improving funds management: Project 2901 ePS contract award delay			−11,877
	Improving funds management: Project 2905 SPOE contract award delay			−9,869
	Restoring acquisition accountability: Project 2905 NP2 rapid fielding pilot concurrency			−51,805
	Insufficient budget justification: Project 2905 unjustified budget increase			−4,804
	Improving funds management: Project 9406 contract award delay			−14,703
	Improving funds management: execution delays			−33,351
	Program increase: NAVSEA readiness and logistics information technology digital transformation plan			+10,000
156	CH–53K RDTE	516,955	506,955	−10,000
	Improving funds management: Early to need			−10,000
160	Ship to Shore Connector [SSC]	4,909	19,909	+15,000
	Program increase: Advanced materials and manufacturing for naval hovercraft applications			+15,000
162	Unmanned Carrier Aviation [UCA]	671,258	657,098	−14,160
	Improving funds management: CVN/UMCS unjustified growth			−14,160
166	Multi–Mission Maritime [MMA] Increment III	177,234	149,234	−28,000
	Restoring acquisition accountability: Engineering change proposal 6 unjustified increase			−28,000
167	Marine Corps Assault Vehicles System Development & Demonstration	77,322	50,222	−27,100
	Restoring acquisition accountability: Design concurrency for additional ACV variants			−6,900
	Restoring acquisition accountability: Procurement of ACV–30 variants early to need			−18,500
	Improving funds management: Technical support acceleration			−1,700
180	Next Generation Fighter	20,698	5,100	−15,598
	Restoring acquisition accountability: Next Gen Advanced Engines funding requested early to need			−15,598
183	Management, Technical & International Support	102,401	122,401	+20,000
	Program increase: Naval research laboratory facilities modernization			+20,000
203	Operational F–35 C2D2	422,881	358,367	−64,514
	Prior year execution delays			−64,514
204	Operational F–35 C2D2	383,741	325,199	−58,542
	Prior year execution delays			−58,542
207	Strategic Sub & Weapons System Support	157,676	119,766	−37,910
	Restoring acquisition accountability: Project 2228 D5LE2 technology maturation concurrency with system architecture and trade analysis			−49,910
	Program increase: High temperature composite material capacity expansion			+12,000
211	F/A–18 Squadrons	213,715	193,715	−20,000
	Restoring acquisition accountability: Project 1662 USMC capability upgrades undefined requirement			−20,000
214	Tomahawk and Tomahawk Mission Planning Center [TMPC]	320,134	226,234	−93,900
	Restoring acquisition accountability: Project 4034 program acceleration			−93,900
215	Integrated Surveillance System	88,382	100,382	+12,000
	Program increase: Transformational Reliable Acoustic Path Systems			+12,000
218	Ground/Air Task Oriented Radar [G/ATOR]	23,891	28,891	+5,000
	Program increase: Low, slow, small targets			+5,000
222	HARM Improvement	138,431	129,829	−8,602

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
	Improving funds management: Project 2189 contract award delay			−8,602
228	Marine Corps Communications Systems	143,317	147,707	+4,390
	Program increase: Shipboard integration and AI networking/NOTM			+4,390
231	Marine Corps Combat Services Support	37,761	45,761	+8,000
	Program increase: Airborne power generation technology development			+5,000
	Program increase: UAV alternative power generation technologies			+3,000
232	USMC Intelligence/Electronic Warfare Systems (MIP)	21,458	27,886	+6,428
	Program increase: Advanced electronic warfare digital payload			+6,428
241	Information Systems Security Program	41,853	46,353	+4,500
	Program increase: High assurance infrastructure in defense systems			+4,500
254	Unmanned Aerial Systems [UAS] Payloads (MIP)	3,704	10,004	+6,300
	Program increase: Spectral and reconnaissance imagery for tactical exploitation			+6,300
255	RQ–4 Modernization	202,346	185,446	−16,900
	Restoring acquisition accountability: IFC 5.0 concurrency			−16,900
257	Depot Maintenance (Non–IF)	38,182	48,182	+10,000
	Program increase: High pressure cold spray systems			+10,000
258	Maritime Technology [MARITECH]	6,779	26,779	+20,000
	Program increase: Advanced additive technologies for sustainment of Navy assets			+20,000
999	Classified Programs	1,613,137	1,667,951	+54,814
	Program increase: Marine Corps Modernization for C2 in a degraded environment			+47,000
	Classified adjustment			+7,814

Prototyping for End Items.—The fiscal year 2020 President's budget request includes more than $1,750,000,000 in Research, Development, Test and Evaluation, Navy for 30 programs that apply acquisition authorities and contracting strategies enabled by legislative authorities provided for the rapid development, rapid prototyping, rapid acquisition, accelerated acquisition, or mid-tier acquisition ("section 804") of warfighter capabilities. The spectrum of programs exercising these types of acquisition authorities ranges from existing programs that have already deployed prototypes to new programs that by virtue of their scope and cost would otherwise be subject to reporting requirements and acquisition regulations applicable to traditional major acquisition category I programs.

While supportive of efforts to deliver capability to the warfighter in an accelerated manner, the Committee is concerned that the growing trend toward acquisition-by-prototyping approach limits the Navy's ability to successfully manage its acquisition programs in the long-term by reducing full understanding of long-term program costs; unnecessarily narrowing down the industrial base early in the acquisition process; and eliminating opportunities for future innovation by reducing competitive opportunities over the course of the acquisition.

The Assistant Secretary of the Navy (Research, Development and Acquisition) is directed to submit to the congressional defense committees with submission of the fiscal year 2021 President's budget request a complete list of approved Navy acquisition programs uti-

lizing prototyping or accelerated acquisition authorities, along with a rational for each selected acquisition strategy, as well as a cost estimate. Further, the Assistant Secretary of the Navy (Research, Development and Acquisition) is directed to provide, for each such approved program, an assessment of the industrial base at the component- and system-level, as well as for system-level integration, to include opportunities for competition in the acquisition. The Assistant Secretary of the Navy (Financial Management and Comptroller) is directed to certify full funding of the acquisition strategies for these programs in the fiscal year 2021 President's budget request, and the Director, Operational Test and Evaluation is directed to certify the appropriateness of the Navy's planned test strategies for such programs, to include a risk assessment.

Maritime Accelerated Acquisitions.—The fiscal year 2020 President's budget request includes $1,327,301,000 for programs designated as Maritime Accelerated Acquisitions by the Assistant Secretary of the Navy (Research, Development and Acquisition) and the Chief of Naval Operations through the Accelerated Acquisitions Board of Directors [AABOD]. The Committee continues its support of efforts to support Combatant Command and Fleet urgent and priority needs and recommends $1,294,046,000 for these programs, consistent with prudent financial management practices.

The Committee notes that in accordance with previous direction, the Assistant Secretary of the Navy (Financial Management and Comptroller) and the Assistant Secretary of the Navy (Research, Development and Acquisition) provided with submission of the fiscal year 2020 President's budget request the acquisition strategy for each designated accelerated acquisition program, to include the associated test strategies as agreed to by the Chief of Naval Operations, the Assistant Secretary of the Navy (Research, Development and Acquisition) and the Director, Operational Test and Evaluation; and certified that the fiscal year 2020 President's budget request fully funds the respective acquisition strategies for each designated accelerated acquisition program. The Committee retains this direction for accelerated acquisition programs with submission of the fiscal year 2021 President's budget request.

Further, the Assistant Secretary of the Navy (Research, Development and Acquisition) and the Director, Operational Test and Evaluation are directed to update the congressional defense committees in a timely manner on any modifications to the test plans for these programs submitted with the fiscal year 2020 President's budget in the year of execution, to include impact on schedule and cost.

Industrial Base for Unmanned and Autonomous Programs.—The fiscal year 2020 President's budget request includes $1,078,823,000 in Research, Development, Test and Evaluation, Navy for unmanned systems programs, an increase of $412,697,000 over amounts enacted in fiscal year 2019. The Committee believes that remotely piloted, unmanned and autonomous technologies can provide valuable capability to the warfighter by augmenting higher-end platforms through additional capability or capacity; reducing risk to the warfighter; and expanding the industrial base, to include commercial and non-traditional vendors.

Therefore, the Committee is concerned that for several unmanned programs the Navy is pursuing acquisition strategies that

would limit future competitive opportunities by awarding system-level prototypes early in the acquisition process and failing to articulate capability, requirements or technology roadmaps to encourage industrial innovation. The Assistant Secretary of the Navy (Research, Development and Acquisition) is directed to submit to the congressional defense committees with the fiscal year 2021 President's budget request such acquisition roadmaps for each unmanned acquisition program that include no less than mission requirements, program requirements for each increment, key technologies, acquisition strategies, test strategies, sub-system and system-level prototyping plans, and cost estimates.

Budgeting for Weapon Systems Modernization.—The fiscal year 2020 President's budget request includes $232,800,000 in Research, Development, Test and Evaluation, Navy for continued modernization of the E–2D Advanced Hawkeye. The Navy has been modernizing the E–2D Advanced Hawkeye through a series of Delta Systems Software Configuration [DSSC] builds in order to stay ahead of advancing threats. For fiscal year 2020, the Navy is requesting $39,000,000 to initiate DSSC #6, which will require at least 6 years of development, integration and test and is estimated to cost approximately $1,700,000,000 for development and production. The Committee notes that the estimated development cost alone for DSSC #6 would breach the acquisition category I threshold for a new acquisition program.

The Navy is taking a similar incremental modernization approach for several other aviation platforms, to include the P–8A Poseidon and F/A–18E/F Super Hornet. The Committee recognizes the need for continuous capability upgrades in light of a constantly evolving threat environment, but is concerned that a lack of full definition of modernization requirements, costs and schedules challenges oversight of these efforts; as well as reduces opportunities to innovate and save costs through competition. Further the Committee has repeatedly identified changes in scope or content of various modernization increments or spirals, as well as test, delivery and fielding schedules, but struggles to identify the corresponding adjustments in respective annual budget requests. Therefore, Assistant Secretary of the Navy (Research, Development and Acquisition) is directed to provide to the congressional defense committees with the fiscal year 2021 President's budget request baselined modernization programs by incremental or spiral, as applicable, for the E–2D Advanced Hawkeye, F/A–18E/F and P–8 Poseidon identifying requirements, acquisition strategies, decision milestones and criteria, costs, schedules and contracting strategies.

MQ–25A Stingray.—The fiscal year 2020 President's budget request includes $671,300,000 in Research, Development, Test and Evaluation, Navy for continued development, integration and test of the MQ–25A Stingray. This includes $63,000,000 for the acquisition of three System Development Test Article [SDTA] aircraft planned for the first quarter of fiscal year 2020, following successful completion of the system design review [SDR]. The Committee notes that in accordance with previous congressional direction, the Assistant Secretary of the Navy (Research, Development and Acquisition) and the Assistant Secretary of the Navy (Financial Management and Comptroller) submitted to the congressional defense

committees with the fiscal year 2020 President's budget request the acquisition strategy for MQ–25A Stingray; as well as a certification that the fiscal year 2020 President's budget request fully funds the acquisition strategy, to include the test strategies as agreed to by the Chief, Naval Operations and the Director, Operational Test and Evaluation [DOTE]. The Committee understands that the current MQ–25A Stingray Test and Evaluation Master Plan [TEMP] is limited to developmental test only and is being updated to reflect operational test requirements. The Committee directs that DOTE provides a briefing to the congressional defense committees on the revised TEMP, and the Assistant Secretary of the Navy (Financial Management and Comptroller) brief the congressional defense committees on the Navy's resourcing strategy for the updated TEMP not later than 15 days after the SDR.

Surface Navy Laser Weapon System.—The fiscal year 2020 President's budget request includes $89,234,000 in Research, Development, Test and Evaluation, Navy for further development, integration and test of one Surface Navy Laser Weapon System [SNLWS] Increment I unit onto a DDG 51 class Flight IIA destroyer in fiscal year 2021. Further, the Chief of Naval Operations submitted a fiscal year 2020 unfunded requirement of $80,000,000 in Other Procurement, Navy for the procurement and installation of one additional SNLWS unit.

The Committee recommends $65,000,000 in Other Procurement, Navy for the procurement of one additional SNLWS unit in fiscal year 2020 and directs that none of the funds may be obligated or expended until thirty days after the Assistant Secretary of the Navy (Research, Development and Acquisition) provides a briefing to the congressional defense committees detailing the results of the Critical Design Review for SNLWS Increment I as well as the acquisition strategy for future SNLWS increments and other Navy Laser Family of Systems programs. Further, the Assistant Secretary of the Navy (Financial Management and Comptroller) is directed to certify to the congressional defense committees with submission of the fiscal year 2021 President's budget request full funding for the first SNLWS production laser weapon system, Government-furnished equipment, Government-furnished information, engineering, support costs and installation. Finally, the Director, Operational Test and Evaluation, is directed to certify to the congressional defense committees, not later than with submission of the fiscal year 2021 President's budget request, appropriate execution of the previously agreed-to test approach for SNLWS.

Office of Naval Research Budget Structure.—The fiscal year 2020 President's budget request includes $2,284,641,000 for science and technology research, a reduction of $267,028,000 from amounts enacted in fiscal year 2019. The Committee continues to believe it is critical to invest in Navy foundational research to ensure U.S. technical superiority in the coming decades and recommends $2,631,992,000 for Navy science and technology research in fiscal year 2020, an increase of $347,351,000, or 15 percent, over the budget request.

The Committee notes that consistent with congressional direction, the fiscal year 2020 President's budget request for the Office of Naval Research [ONR] retains the previously agreed-upon pro-

gram element structure for Navy science and technology projects. The Committee continues to support this budget structure. Further, the Committee believes that based on lessons learned, prototyping efforts managed by ONR require additional acquisition-type oversight, fiscal clarity and adherence to financial management practices in order to avoid the schedule and cost growth seen in the Solid State Laser-Technology Maturation program. The Assistant Secretary of the Navy (Financial Management and Comptroller) is directed to present a plan to the congressional defense committees to establish appropriate project units within the current ONR budget structure for such projects.

Office of Naval Research Budget Justification Materials.—The Committee notes the Chief, Naval Research's information security concerns with respect to certain technology development plans and concurs with the need to appropriately manage the security posture relative to these efforts. However, the Committee notes that the timely and transparent transmission of details associated with these efforts to the congressional defense committees remains highly unsatisfactory. Therefore, the Committee directs the Assistant Secretary of the Navy (Financial Management and Comptroller) to coordinate with the Chief, Naval Research, to ensure that for the projects in question, specific information required by the congressional defense committees for their budget review be provided concurrent with submission of the President's budget in the appropriate format.

Task Force Ocean.—The fiscal year 2020 President's budget request includes $19,052,000, an increase of $16,978,000 over amounts enacted for fiscal year 2019, for ocean acoustics science and technology efforts that will enable tactical maneuver for the future submarine force. The Committee supports these efforts and recommends an additional $7,000,000 for these efforts. Further, the Committee directs the Chief, Naval Research, to provide with submission of the fiscal year 2021 President's budget request a report detailing activities conducted with these funds by project, to include transition plans.

Unmanned Surface Vessels.—The fiscal year 2020 President's budget request includes $446,800,000 in Research, Development, Test and Evaluation, Navy for Medium [MUSV] and Large Unmanned Surface Vessels [LUSV] and associated enabling capabilities. The Committee fully supports additional investments in unmanned and autonomous technologies, systems and sub-systems, including surface and sub-surface vessels. However, the Committee is concerned with the proposed acquisition and funding strategies for the MUSV and LUSV in this budget request, to include the Future Years Defense Program. Therefore, the Committee recommends several adjustments, as detailed elsewhere in this report, and directs the Assistant Secretary of the Navy (Research, Development and Acquisition) to review the acquisition strategies for these programs to address congressional concerns, as appropriately balanced with warfighter needs.

Future Surface Combatant Force.—The fiscal year 2020 President's budget request includes $80,145,000 for continued studies and analyses of the Future Surface Combatant Force [FSCF], to include concept refinement, trade studies, hull and power design ef-

forts and draft specification development of a Large Surface Combatant [LSC]. The Committee understands that the Navy plans to begin procuring a LSC in fiscal year 2025, shortly after conclusion of the current DDG–51 Flight III multi-year procurement program and the planned delivery of the first ship under that multi-year procurement contract in fiscal year 2024. The Committee finds this acquisition strategy high-risk and recommends a reduction of $46,550,000 to the FSCF request.

Further, the Committee is aware of the Navy's Surface Capability Evolution Plan [SCEP], including the LSC, that informs the FSCF, and directs the Assistant Secretary of the Navy (Research, Development and Acquisition) to provide with the fiscal year 2021 President's budget request the acquisition strategies for each element of the SCEP, as previously requested. Further, the Assistant Secretary of the Navy (Financial Management and Comptroller) is directed to provide with the fiscal year 2021 President's budget request cost estimates for each element of the SCEP, and to certify full funding in the budget request for each respective acquisition strategy of the SCEP elements.

CVN 78 Sortie Generation Rate.—Consistent with direction contained in Senate Report 115–290, accompanying the Department of Defense Appropriations Act, 2019, the Program Executive Officer, Aircraft Carriers, in coordination with the Director, Operational Test and Evaluation, provided an updated plan to the congressional defense committees for the CVN 78 Sortie Generation Rate [SGR] demonstration schedule and test requirements. Further, the Assistant Secretary of the Navy (Financial Management and Comptroller) certified SGR demonstration full funding in the fiscal year 2020 President's budget request. The Committee notes the completed plans for sustained SGR and that the plan for addressing the SGR surge pace was to be developed by September 2019. Noting potential delays to the CVN 78 schedule since submission of the fiscal year 2020 President's budget request, the Program Executive Officer, Aircraft Carriers, and the Director, Operational Test and Evaluation, are directed to provide the congressional defense committees an update on plans for addressing SGR surge pace not later than October 1, 2019.

Conventional Prompt Strike.—The fiscal year 2020 President's budget request includes $593,120,000 for the continued development of a Conventional Prompt Strike [CPS] capability. The Committee notes that the Navy's CPS program will build on efforts previously funded by the Department of Defense with the intent of providing an initial CPS capability for a sea-based platform in fiscal year 2025. The Committee further notes that the Assistant Secretary of the Navy (Research, Development and Acquisition) has approved Section 804 Middle Tier Acquisition rapid prototyping authority as the acquisition strategy for this program. The Committee supports the investment in technologies to address the evolving hypersonic threat, and notes that under a 2018 Memorandum of Agreement with the Army, Air Force, and Missile Defense Agency, the Navy is tasked with designing an intermediate range conventional prompt strike common hypersonic glide body for transition to the Army for production.

The Committee is concerned that the Navy is accelerating the CPS program in a near-sole source environment without a clear understanding of technology and schedule risks, as well as costs. The Committee notes that the Director, Cost Assessment and Program Evaluation [CAPE], has not conducted an Independent Cost Estimate [ICE] for CPS and that the Navy continues to refine its cost estimate. The Committee further notes that the Navy plans to invest in excess of $5,500,000,000 in CPS and associated efforts and procure a significant number of CPS all up rounds prior to making a production decision.

The Committee directs the Director, CAPE, to provide with submission of the fiscal year 2021 President's budget request an ICE for CPS. Further, the Committee directs the Assistant Secretary of the Navy (Research, Development and Acquisition) to submit to the congressional defense committees, not later than with submission of the fiscal year 2021 President's budget request, the service cost position for CPS, as well as the test strategy. Concurrently, the Assistant Secretary of the Navy (Financial Management and Comptroller) is directed to certify full funding of the acquisition requirements, and the Director, Operational Test and Evaluation, is directed to certify the equivalent of the test and evaluation master plan to the congressional defense committees.

AEGIS Baselines Budget Estimates.—The fiscal year 2020 President's budget request includes $74,400,000 in Research, Development, Test and Evaluation, Navy and $43,600,000 in Research, Development, Test and Evaluation, Defense-Wide for AEGIS Baseline 9 upgrades, an increase of $89,000,000 over amounts projected to be required for such efforts in fiscal year 2020 in the previous budget request. While cautiously optimistic that the Navy and Missile Defense Agency have improved the common understanding and definitions of AEGIS baseline capabilities, the Committee remains concerned by constant changes to AEGIS baseline scope and requirements, many of which are based on the introduction of new capabilities to the warfighter, but not identified as such. The Committee is concerned that the true development and fielding costs of new or additional warfighter capabilities are obfuscated by the lack of identification of associated costs levied on enabling programs such as AEGIS. The Committee recommends a 10 percent increase for AEGIS Baseline 9 over amounts enacted for fiscal year 2019.

CH–53K System Demonstration Test Article Aircraft.—The Committee notes that at the request of the Marine Corps, two System Demonstration Test Article [SDTA] aircraft were added to the CH–53K development program in fiscal year 2015, which already included one ground test vehicle, four engineering development models, and four SDTA aircraft. In January 2019, the Committee was informed that the Marine Corps issued a 'stop work' for the 5th and 6th SDTA aircraft due to cost, schedule and technical challenges, and that the Marine Corps restructured the development and test schedule for the CH–53K program.

The Committee notes that the 5th and 6th SDTA aircraft were incrementally funded with research, development, test and evaluation funding and that the reallocation of those parts to production aircraft at this time would be inappropriate. The Assistant Secretary of the Navy (Research, Development and Acquisition) is di-

rected to provide an update to the congressional defense committees on the Marine Corps' plans for the previously procured parts of the 5th and 6th SDTA aircraft no less than thirty days prior to the execution of any such plans, and the Assistant Secretary of the Navy (Financial Management and Comptroller) is directed to certify to the congressional defense committees the appropriate use of funds for any such plans.

Offensive Anti-Surface Warfare/Long Range Anti-Ship Missile 1.1.—The fiscal year 2020 President's budget request includes $65,400,000 in Research, Development, Test and Evaluation, Navy for continued development of the Offensive Anti-Surface Warfare/Long Range Anti-Ship Missile 1.1 [LRASM 1.1] capability. The Committee notes that with submission of the fiscal year 2020 President's budget request, the Navy reduced the scope of LRASM capability improvements, previously included in LRASM 1.1. Given the evolving threat environment, the Committee does not concur with this approach and recommends $50,000,000 to address those shortfalls, including but not limited to beyond line of sight capabilities, survivability enhancements, range improvements and obsolescence upgrades.

The Committee directs the Director, Operational Test and Evaluation to provide to the congressional defense committees with the fiscal year 2021 President's budget request, an updated plan for LRASM 1.0 and LRASM 1.1 full independent operational test [IOT&E] to include an identification of the required IOT&E rounds as well as an updated test and evaluation master plan; and directs the Assistant Secretary of the Navy (Research, Development and Acquisition) to submit an acquisition strategy that supports that test strategy. Further, the Assistant Secretary of the Navy (Financial Management and Comptroller) is directed to certify that the fiscal year 2021 President's budget request for LRASM 1.0 and LRASM 1.1 fully funds the development of capability improvements and the associated test strategies.

Amphibious Combat Vehicle.—The fiscal year 2020 President's budget request includes $77,322,000 for continued development of the Amphibious Combat Vehicle [ACV] 1.1 and 1.2, which were merged into a single acquisition program subsequent to the budget submission. The ACV program consists of a personnel variant, as well as three additional supporting mission role variants for command and control, gun and recovery/maintenance missions. The Committee notes that in fiscal year 2019, the Marine Corps accelerated the development of the command and control mission variant by 1 year. The Committee understands that the Marine Corps also plans to accelerate the development of the gun mission role variant by 1 year in fiscal year 2020. Given the Marine Corps' long and troubled acquisition history to replace and modernize the Assault Amphibious Vehicle, the risk of destabilizing the industrial base, as well as reports by the Director, Operational Test and Evaluation, the Committee finds this additional proposed acceleration risky and recommends no funds for the procurement of the gun mission role variant in fiscal year 2020.

Advanced Digital Radar Basic Research.—The Committee notes the advances in the field of radar development with respect to phased array radar technology in a digital design. The Committee

encourages the Navy to continue to support partnerships with laboratory-based antenna test facilities that will help the Navy understand, characterize, and calibrate advanced all-digital radars. The Committee further notes that the development of this technology is a critical enabler for the Navy in the development of tools to increase target detection, as well as to improve electronic warfare and adaptive sensing capabilities and recommends an additional $8,000,000 for these development efforts.

Aircraft Fleet Readiness and Sustainment.—The Committee remains concerned about the long-term critical challenges facing the Navy in maintaining the readiness of air vehicle fleets and extending the useful life of aging aircraft. The Committee continues to support the role and expertise university research institutions can provide in performing basic research and development that can translate into technological capabilities to assist the Navy with addressing current and future technical and engineering challenges in these areas. The Committee recommends an additional $8,000,000 for basic university research in support of the Navy's long-term, air vehicle fleet readiness and sustainment conducted at university institutions with state-of-the art research and development capabilities in structures and materials.

Lithium-ion Battery Safety and Performance Improvements.—The Committee continues to support Navy investments in power generation and energy storage research. The Committee understands that development and deployment of lithium-ion batteries are critical to Department of Defense missions, but that safety incidents restrict their operational use. Therefore, the Committee believes that the development and qualification of materials technologies, including non-flammable electrolytes, to reduce the risk of thermal runaway and improve safety and performance in lithium-ion batteries should be a research priority.

Electric Propulsion for Military Craft and Advanced Planing Hulls.—The Committee notes with appreciation the high operational tempo of Naval Special Warfare maritime units, such as the Special Warfare Combatant Craft and Coastal Riverine Force squadrons, in the performance of national missions that require technological advantage, unsurpassed equipment performance, and stealth. These units are equipped with a variety of surface craft for transit to and from mission areas, almost all of which are fossil fuel powered. The Committee is aware that U.S. Special Operations Command has identified mission-critical capability objectives for hybrid propulsion technologies and low signature management that, in the face of increasingly technologically advanced adversaries, make it critical that such systems are fielded without delay. Therefore, the Committee recommends an additional $8,500,000 for the design, development and testing of a complete marine electric propulsion system.

Talent and Technology for Navy Power and Energy Systems.—The Committee has supported the Navy's investment in next-generation combat systems such as directed energy weapons. While directed energy weapons are part of a strategy to maintain military technological advantage, they also create new energy challenges for the ships and submarines deploying them. Therefore, the Committee recommends an increase of $9,500,000 for a combination of

workforce talent and technology development efforts in support of Navy power and energy systems, such as bridge-to-university programs for underprepared university enrollees and digital twin research.

Energy Resilience.—The Committee recognizes the need for additional research to assist the Secretary of the Navy in efforts to create a more robust energy infrastructure. To achieve military energy resiliency, the Committee believes that these challenges can be best met by leveraging experienced energy university researchers in concert with industry partners and the Navy. Specific areas of interest include addressing electrical power intermittency, integrating renewable energy sources into the grid, energy storage, improved micro-grids, grid security, local generation of zero-carbon fuels, and the inspection and structural health monitoring of critical energy infrastructure.

Navy Alternative Energy Research.—The Committee recommends an increase of $20,000,000 for Navy alternative energy research. The Committee notes the value of investing in energy research and encourages the Navy to continue research, development, testing and deployment of advanced energy systems with the potential to reduce the cost of energy and increase energy security, reliability, and resiliency at Department of Defense facilities while pursuing longer-term emphasis on grid-connected power generation. The Committee understands that the integration of emerging land and ocean-based energy generation and end-use energy efficiency technologies has the potential to improve Navy resilience. Further, the Committee encourages the Navy to invest in energy demonstration activities relating to Department of Defense facilities and activities in coordination with other Federal agencies and entities.

Noise Induced Hearing Loss.—The Committee supports the Department's noise induced hearing loss research and development initiative and encourages the Navy to expand research and development of a novel noise-level enabled drug dosing and delivery system designed to shield the ear tissue from mechanical stimuli that would otherwise cause temporary or permanent hearing loss.

Energetics Research.—The Committee is concerned about advances adversaries are making in advanced energetics and believes that there is a need for a renewed, long-term investment in research and development for advanced energetics to increase the lethality, range and speed of weapons, develop new leap-ahead capabilities, and to grow the national energetics workforce. Therefore, the Committee recommends an increase of $8,000,000 for energy technology research. The Committee encourages the Department of the Navy to execute the funding for the necessary efforts with the naval research and development establishment best suited to advance the overall knowledge, expertise and capability of energetics and to incorporate these developments into advanced weapon systems.

Instrumented Tow Cable.—The Committee recognizes the importance of accurate, real-time water temperature and other environmental data to the operations of the Navy's submarine force. The Committee remains concerned that there are capability gaps and unmet requirements with existing temperature and environmental data measurement that the fleet uses to generate this information,

including reliance on a single point measurement system. Therefore, the Committee encourages the Navy to complete a comprehensive review examining the current system's limitations and explore the efficacy of deploying a more sophisticated instrumented cable system technology that enables real-time, multisource collection to improve accuracy and fleet operations.

Resident Autonomous Undersea Robotics.—The Committee encourages the Secretary of the Navy to continue supporting the cost-effective development of resident autonomous undersea robotic systems, including research, testing, and demonstration of technologies that will support persistent surveillance, security and related fleet readiness requirements. The Committee believes that university-based research and innovation centered on the development of resident autonomous undersea robotic technologies will be essential in maintaining competitive advantage in the future.

Automated Critical Care System.—The fiscal year 2020 President's budget request includes no funds to conclude development of an automated critical care system. The Committee notes that advanced medical care for marines and sailors deployed in remote locations or on ships poses a serious and unique challenge. The potential deterioration of these injured service members while being stabilized, especially in prolonged field care scenarios and during transport to a facility possessing high-level medical care, especially in remote austere deployments, is concerning. The Committee believes that incorporation of state-of-the-art medical device technologies such as automated critical care systems with decision support may be the difference between life and death and will have a significant impact in medical care for both the military and civilian communities dealing with mass casualties. Therefore, the Committee recommends $1,200,000 for additional development of an automated critical care system.

Shipbuilding Manufacturing.—The Committee recognizes the importance of building strong partnerships among Department of Navy research labs, academia and naval shipyards that construct our nation's submarines. The Committee encourages the Navy to coordinate manufacturing efforts with industrial base partners to ensure that funded research projects are relevant to specific engineering and manufacturing needs, as well as defined systems capabilities. Partnerships with academia should focus on well-defined submarine and autonomous undersea vehicle research needs, accelerated technology transition projects and workforce development to help ensure a sustainable industrial base. The Committee believes that all manufacturing efforts should focus on reducing the cost of manufacturing and sustaining the submarine fleet.

Silicon Carbide Electronics Systems.—The Committee understands that use of silicon carbide power modules may reduce the size and weight of power conversion modules and other electronic systems necessary for advanced sensors and weapon systems. Therefore, the Committee recommends $7,000,000 for silicon carbide electronics systems research and encourages the Secretary of the Navy to continue to invest in advanced power and energy technology, and accelerate the qualification of silicon carbide power modules to be used on high power, mission-critical Navy platforms

accelerated through the use of virtual system architecture in testing.

Marine Energy Systems for Sensors and Microgrids.—The Committee recognizes that a broader range of experimentation, prototyping, and development is necessary for powering maritime security systems, at-sea persistent surveillance and communications systems and for charging unmanned undersea vehicles. The Committee encourages the Secretary of the Navy to collaborate with affiliated research facilities to accelerate the development and incorporation of new novel energy technologies, such as marine hydrokinetic energy converters, for autonomous systems and tactical energy solutions.

Active Vibration Control System.—The Committee encourages the Navy and Marine Corps to consider the benefits of reducing vibration in the V–22 engine nacelle to reduce maintenance degraders and increase operational readiness of the aircraft. Therefore, the Committee recommends an additional $5,000,000 to demonstrate and optimize an active vibration control solution within the overall nacelle improvement program.

Command and Control Satellite Systems Cyber Security.—The Committee recognizes the vast, rapidly evolving space-based cybersecurity threat facing the U.S. and the direct threats this poses against the U.S. Government, critical infrastructure components, and the general economy for security critical functions. Therefore, the Committee recommends an additional $20,000,000 for the development of Command and Control Satellite Systems Cyber Security.

Spectral and Reconnaissance Imagery for Tactical Exploitation.—The Committee recognizes the versatility and broad application spectral and reconnaissance imagery for tactical exploitation brings to the warfighter supporting intelligence, surveillance and reconnaissance mission requirements. The Committee understands that certain capabilities are available for integration and testing on the Navy's RQ–21A Blackjack unmanned aircraft prior to completion of an entire end-to-end system. Therefore, the Committee recommends an additional $6,300,000 to prototype payloads for development into mission kits for the RQ–21A Blackjack. Additionally, these funds will provide for the field user evaluations and other operational testing requirements.

High Pressure Cold Spray Systems.—The Committee notes that sustainment drives significant acquisition costs to ships and submarines, and understands that the utilization of high pressure cold spray systems for ship and submarine maintenance and repairs can result in significant cost savings. Therefore, the Committee recommends an additional $10,000,000 for this purpose.

Advanced Additive Technologies for Sustainment of Navy Assets.—The Committee understands that to accelerate the delivery of technical capabilities for the warfighter in a timely manner, additional development of additive manufacturing is required. The Committee recommends an additional $20,000,000 for this purpose.

RESEARCH, DEVELOPMENT, TEST AND EVALUATION, AIR FORCE

Appropriations, 2019	$41,229,475,000
Budget estimate, 2020	45,616,122,000
Committee recommendation	45,446,727,000

The Committee recommends an appropriation of $45,446,727,000. This is $169,395,000 below the budget estimate.

COMMITTEE RECOMMENDED PROGRAM

The following table summarizes the budget estimate for this appropriation, the Committee recommendation, and the Committee recommended adjustments to the budget estimate:

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
	RESEARCH, DEVELOPMENT, TEST & EVAL, AIR FORCE			
	BASIC RESEARCH			
1	DEFENSE RESEARCH SCIENCES	356,107	406,107	+50,000
2	UNIVERSITY RESEARCH INITIATIVES	158,859	158,859	
3	HIGH ENERGY LASER RESEARCH INITIATIVES	14,795	14,795	
	TOTAL, BASIC RESEARCH	529,761	579,761	+50,000
	APPLIED RESEARCH			
4	MATERIALS	128,851	210,351	+81,500
5	AEROSPACE VEHICLE TECHNOLOGIES	147,724	157,724	+10,000
6	HUMAN EFFECTIVENESS APPLIED RESEARCH	131,795	134,795	+3,000
7	AEROSPACE PROPULSION	198,775	219,775	+21,000
8	AEROSPACE SENSORS	202,912	214,912	+12,000
10	SCIENCE AND TECHNOLOGY MANAGEMENT—MAJOR HEADQUARTERS	7,968	7,968	
12	CONVENTIONAL MUNITIONS	142,772	142,772	
13	DIRECTED ENERGY TECHNOLOGY	124,379	124,379	
14	DOMINANT INFORMATION SCIENCES AND METHODS	181,562	211,062	+29,500
15	HIGH ENERGY LASER RESEARCH	44,221	49,221	+5,000
16	SPACE TECHNOLOGY	124,667	154,667	+30,000
	TOTAL, APPLIED RESEARCH	1,435,626	1,627,626	+192,000
	ADVANCED TECHNOLOGY DEVELOPMENT			
17	ADVANCED MATERIALS FOR WEAPON SYSTEMS	36,586	50,086	+13,500
18	SUSTAINMENT SCIENCE AND TECHNOLOGY [S&T]	16,249	16,249	
19	ADVANCED AEROSPACE SENSORS	38,292	42,292	+4,000
20	AEROSPACE TECHNOLOGY DEV/DEMO	102,949	202,949	+100,000
21	AEROSPACE PROPULSION AND POWER TECHNOLOGY	113,973	155,973	+42,000
22	ELECTRONIC COMBAT TECHNOLOGY	48,408	48,408	
23	ADVANCED SPACECRAFT TECHNOLOGY	70,525	80,525	+10,000
24	MAUI SPACE SURVEILLANCE SYSTEM [MSSS]	11,878	11,878	
25	HUMAN EFFECTIVENESS ADVANCED TECHNOLOGY DEVELOPMENT	37,542	37,542	
26	CONVENTIONAL WEAPONS TECHNOLOGY	225,817	225,817	
27	ADVANCED WEAPONS TECHNOLOGY	37,404	37,404	
28	MANUFACTURING TECHNOLOGY PROGRAM	43,116	105,716	+62,600
29	BATTLESPACE KNOWLEDGE DEVELOPMENT & DEMONSTRATION	56,414	56,414	
	TOTAL, ADVANCED TECHNOLOGY DEVELOPMENT	839,153	1,071,253	+232,100
	ADVANCED COMPONENT DEVELOPMENT			
31	INTELLIGENCE ADVANCED DEVELOPMENT	5,672	5,672	
32	COMBAT IDENTIFICATION TECHNOLOGY	27,085	27,085	
33	NATO RESEARCH AND DEVELOPMENT	4,955	4,955	
34	IBCM DLM/VAL	44,109	44,109	
35	POLLUTION PREVENTION-DEM/VAL		3,000	+3,000
36	AIR FORCE WEATHER SERVICES RESEARCH	772	772	
37	ADVANCED ENGINE DEVELOPMENT	878,442	608,442	−270,000

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
38	LONG RANGE STRIKE	3,003,899	2,898,099	−105,800
39	DIRECTED ENERGY PROTOTYPING	10,000	24,000	+14,000
40	HYPERSONICS PROTOTYPING	576,000	576,000	.....
41	INTEGRATED AVIONICS PLANNING AND DEVELOPMENT	92,600	92,600	.....
42	ADVANCED TECHNOLOGY AND SENSORS	23,145	23,145	.....
43	NATIONAL AIRBORNE OPS CENTER [NAOC] RECAP	16,669	12,669	−4,000
44	TECHNOLOGY TRANSFER	23,614	27,614	+4,000
45	HARD AND DEEPLY BURIED TARGET DEFEAT SYSTEM	113,121	113,121	.....
46	CYBER RESILIENCY OF WEAPON SYSTEMS-ACS	56,325	56,325	.....
47	DEPLOYMENT AND DISTRIBUTION ENTERPRISE R&D	28,034	28,034	.....
48	TECH TRANSITION PROGRAM	128,476	179,476	+51,000
49	GROUND BASED STRATEGIC DETERRENT	570,373	657,495	+87,122
50	LIGHT ATTACK ARMED RECONNAISSANCE [LAAR] SQUADRONS	35,000	2,000	−33,000
51	NEXT GENERATION AIR DOMINANCE	1,000,000	960,000	−40,000
52	THREE DIMENSIONAL LONG-RANGE RADAR	37,290	23,190	−14,100
53	UNIFIED PLATFORM [UP]	10,000	10,000	.....
54	COMMON DATA LINK EXECUTIVE AGENT [CDL EA]	36,910	36,910	.....
55	CYBERSPACE OPERATIONS FORCES AND FORCE SUPPORT	35,000	35,000	.....
56	MISSION PARTNER ENVIRONMENTS	8,550	8,550	.....
57	CYBER OPERATIONS TECHNOLOGY DEVELOPMENT	198,864	240,064	+41,200
58	ENABLED CYBER ACTIVITIES	16,632	16,632	.....
60	CONTRACTING INFORMATION TECHNOLOGY SYSTEM	20,830	20,830	.....
61	GLOBAL POSITIONING SYSTEM USER EQUIPMENT (SPACE)	329,948	320,598	−9,350
62	EO/IR WEATHER SYSTEMS	101,222	.....	−101,222
63	WEATHER SYSTEM FOLLOW-ON	225,660	205,660	−20,000
64	SPACE SITUATION AWARENESS SYSTEMS	29,776	24,776	−5,000
65	SPACE SYSTEMS PROTOTYPE TRANSITIONS [SSPT]	142,045	142,045	.....
67	SPACE CONTROL TECHNOLOGY	64,231	59,231	−5,000
68	SPACE SECURITY AND DEFENSE PROGRAM	56,385	46,385	−10,000
69	PROTECTED TACTICAL ENTERPRISE SERVICE [PTES]	105,003	105,003	.....
70	PROTECTED TACTICAL SERVICE [PTS]	173,694	163,694	−10,000
71	EVOLVED STRATEGIC SATCOM [ESS]	172,206	172,206	.....
72	SPACE RAPID CAPABILITIES OFFICE	33,742	9,000	−24,742
	TOTAL, ADVANCED COMPONENT DEVELOPMENT	8,436,279	7,984,387	−451,892
	ENGINEERING & MANUFACTURING DEVELOPMENT			
73	FUTURE ADVANCED WEAPON ANALYSIS & PROGRAMS	246,200	5,000	−241,200
74	INTEGRATED AVIONICS PLANNING AND DEVELOPMENT	67,782	67,782	.....
75	NUCLEAR WEAPONS SUPPORT	4,406	4,406	.....
76	ELECTRONIC WARFARE DEVELOPMENT	2,066	2,066	.....
77	TACTICAL DATA NETWORKS ENTERPRISE	229,631	189,631	−40,000
78	PHYSICAL SECURITY EQUIPMENT	9,700	9,700	.....
79	SMALL DIAMETER BOMB [SDB]	31,241	55,241	+24,000
80	AIRBORNE ELECTRONIC ATTACK	2	.....	−2
81	ARMAMENT/ORDNANCE DEVELOPMENT	28,043	28,043	.....
82	SUBMUNITIONS	3,045	3,045	.....
83	AGILE COMBAT SUPPORT	19,944	26,944	+7,000
84	LIFE SUPPORT SYSTEMS	8,624	8,624	.....
85	COMBAT TRAINING RANGES	37,365	52,365	+15,000
86	F–35—EMD	7,628	7,628	.....
87	LONG RANGE STANDOFF WEAPON	712,539	712,539	.....
88	ICBM FUZE MODERNIZATION	161,199	161,199	.....
89	JOINT TACTICAL NETWORK CENTER [JTNC]	2,414	2,414	.....
91	OPEN ARCHITECTURE MANAGEMENT	30,000	30,000	.....
93	KC–46	59,561	94,561	+35,000
94	ADVANCED PILOT TRAINING	348,473	332,173	−16,300
95	COMBAT RESCUE HELICOPTER	247,047	247,047	.....
98	B–2 DEFENSIVE MANAGEMENT SYSTEM	294,400	250,100	−44,300
99	NUCLEAR WEAPONS MODERNIZATION	27,564	27,564	.....
100	MINUTEMAN SQUADRONS	1	1	.....
101	F–15 EPAWSS	47,322	47,322	.....
102	STAND IN ATTACK WEAPON	162,840	162,840	.....
103	FULL COMBAT MISSION TRAINING	9,797	9,797	.....

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
106	C–32 EXECUTIVE TRANSPORT RECAPITALIZATION	9,930	9,930	
107	PRESIDENTIAL AIRCRAFT REPLACEMENT	757,923	757,923	
108	AUTOMATED TEST SYSTEMS	2,787	2,787	
109	COMBAT SURVIVOR EVADER LOCATOR	2,000	2,000	
110	GPS III FOLLOW ON [GPS IIIF]	462,875	447,875	−15,000
111	SPACE SITUATION AWARENESS OPERATIONS	76,829	56,829	−20,000
112	COUNTERSPACE SYSTEMS	29,037	29,037	
113	WEATHER SYSTEM FOLLOW-ON	2,237	2,237	
114	SILENT BARKER	412,894	362,894	−50,000
116	ADVANCED EHF MILSATCOM (SPACE)	117,290	117,290	
117	POLAR MILSATCOM (SPACE)	427,400	401,400	−26,000
118	WIDEBAND GLOBAL SATCOM (SPACE)	1,920	1,920	
119	SPACE BASED INFRARED SYSTEM [SBIRS] HIGH EMD	1	1	
120	NEXT—GENERATION OPIR	1,395,278	1,930,778	+535,500
122	NATIONAL SECURITY SPACE LAUNCH EMD	432,009	462,009	+30,000
122A	TACTICALLY RESPONSIVE LAUNCH OPERATIONS		22,000	+22,000
	TOTAL, ENGINEERING & MANUFACTURING DEVELOPMENT	6,929,244	7,144,942	+215,698
	RDT&E MANAGEMENT SUPPORT			
123	THREAT SIMULATOR DEVELOPMENT	59,693	59,693	
124	MAJOR T&E INVESTMENT	181,663	75,663	−106,000
125	RAND PROJECT AIR FORCE	35,258	35,258	
127	INITIAL OPERATIONAL TEST & EVALUATION	13,793	13,793	
128	TEST AND EVALUATION SUPPORT	717,895	717,895	
129	ACQ WORKFORCE—GLOBAL POWER	258,667	255,667	−3,000
130	ACQ WORKFORCE—GLOBAL VIG & COMBAT SYS	251,992	249,992	−2,000
131	ACQ WORKFORCE—GLOBAL REACH	149,191	149,191	
132	ACQ WORKFORCE—CYBER, NETWORK, & BUS SYS	235,360	235,360	
133	ACQ WORKFORCE—GLOBAL BATTLE MGMT	160,196	160,196	
134	ACQ WORKFORCE—CAPABILITY INTEGRATION	220,255	228,255	+8,000
135	ACQ WORKFORCE—ADVANCED PRGM TECHNOLOGY	42,392	39,392	−3,000
136	ACQ WORKFORCE—NUCLEAR SYSTEMS	133,231	133,231	
137	MANAGEMENT HQ—R&D	5,590	5,590	
138	FACILITIES RESTORATION & MODERNIZATION—TEST & EVAL	88,445	88,445	
139	FACILITIES SUSTAINMENT—TEST AND EVALUATION SUPPORT	29,424	29,424	
140	REQUIREMENTS ANALYSIS AND MATURATION	62,715	80,715	+18,000
141	MANAGEMENT HQ—T&E	5,013	5,013	
142	ENTERPRISE INFORMATION SERVICES [EIS]	17,128	10,628	−6,500
143	ACQUISITION AND MANAGEMENT SUPPORT	5,913	5,913	
144	GENERAL SKILL TRAINING	1,475	6,475	+5,000
146	INTERNATIONAL ACTIVITIES	4,071	4,071	
147	SPACE TEST AND TRAINING RANGE DEVELOPMENT	19,942	19,942	
148	SPACE AND MISSILE CENTER [SMC] CIVILIAN WORKFORCE	167,810	167,810	
149	SPACE & MISSILE SYSTEMS CENTER—MHA	10,170	10,170	
150	ROCKET SYSTEMS LAUNCH PROGRAM (SPACE)	13,192	13,192	
151	SPACE TEST PROGRAM [STP]	26,097	26,097	
	TOTAL, RDT&E MANAGEMENT SUPPORT	2,916,571	2,827,071	−89,500
	OPERATIONAL SYSTEMS DEVELOPMENT			
152	ADVANCED BATTLE MANAGEMENT SYSTEM [ABMS]	35,611	43,611	+8,000
154	SPECIALIZED UNDERGRADUATE FLIGHT TRAINING	2,584	2,584	
156	DEPLOYMENT & DISTRIBUTION ENTERPRISE R&D	903	903	
157	F–35 C2D2	694,455	588,511	−105,944
158	AIR FORCE INTEGRATED MILITARY HUMAN RESOURCES SYSTEM	40,567	40,567	
159	ANTI-TAMPER TECHNOLOGY EXECUTIVE AGENCY	47,193	47,193	
160	FOREIGN MATERIEL ACQUISITION AND EXPLOITATION	70,083	70,083	
161	HC/MC–130 RECAP RDT&E	17,218	17,218	
162	NC3 INTEGRATION	25,917	25,917	
164	B–52 SQUADRONS	325,974	329,974	+4,000
165	AIR–LAUNCHED CRUISE MISSILE [ALCM]	10,217	10,217	
166	B–1B SQUADRONS	1,000	1,000	
167	B–2 SQUADRONS	97,276	98,076	+800

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
168	MINUTEMAN SQUADRONS	128,961	104,219	−24,742
170	WORLDWIDE JOINT STRATEGIC COMMUNICATIONS	18,177	22,177	+4,000
171	INTEGRATED STRATEGIC PLANNING & ANALYSIS NETWORK	24,261	24,261	
172	ICBM REENTRY VEHICLES	75,571	41,271	−34,300
174	UH–1N REPLACEMENT PROGRAM	170,975	170,975	
176	MQ–9 UAV	154,996	127,296	−27,700
178	A–10 SQUADRONS	36,816	31,916	−4,900
179	F–16 SQUADRONS	193,013	193,013	
180	F–15E SQUADRONS	336,079	694,229	+358,150
181	MANNED DESTRUCTIVE SUPPRESSION	15,521	15,521	
182	F–22 SQUADRONS	496,298	546,298	+50,000
183	F–35 SQUADRONS	99,943	99,943	
184	TACTICAL AIM MISSILES	10,314	10,314	
185	ADVANCED MEDIUM RANGE AIR–TO–AIR MISSILE [AMRAAM]	55,384	55,384	
186	COMBAT RESCUE—PARARESCUE	281	281	
187	AF TENCAP	21,365	21,365	
188	PRECISION ATTACK SYSTEMS PROCUREMENT	10,696	10,696	
189	COMPASS CALL	15,888	31,888	+16,000
190	AIRCRAFT ENGINE COMPONENT IMPROVEMENT PROGRAM	112,505	112,505	
191	JOINT AIR-TO-SURFACE STANDOFF MISSILE [JASSM]	78,498	78,498	
192	AIR AND SPACE OPERATIONS CENTER [AOC]	114,864	114,864	
193	CONTROL AND REPORTING CENTER [CRC]	8,109	8,109	
194	AIRBORNE WARNING AND CONTROL SYSTEM [AWACS]	67,996	67,996	
195	TACTICAL AIRBORNE CONTROL SYSTEMS	2,462	2,462	
197	COMBAT AIR INTELLIGENCE SYSTEM ACTIVITIES	13,668	13,668	
198	TACTICAL AIR CONTROL PARTY—MOD	6,217	4,117	−2,100
200	DCAPES	19,910	19,910	
201	NATIONAL TECHNICAL NUCLEAR FORENSICS	1,788	1,788	
202	SEEK EAGLE	28,237	28,237	
203	USAF MODELING AND SIMULATION	15,725	15,725	
204	WARGAMING AND SIMULATION CENTERS	4,316	4,316	
205	BATTLEFIELD ABN COMM NODE [BACN]	26,946	26,946	
206	DISTRIBUTED TRAINING AND EXERCISES	4,303	4,303	
207	MISSION PLANNING SYSTEMS	71,465	71,465	
208	TACTICAL DECEPTION	7,446	7,446	
209	OPERATIONAL HQ—CYBER	7,602	7,602	
210	DISTRIBUTED CYBER WARFARE OPERATIONS	35,178	35,178	
211	AF DEFENSIVE CYBERSPACE OPERATIONS	16,609	44,109	+27,500
212	JOINT CYBER COMMAND AND CONTROL [JCC2]	11,603	11,603	
213	UNIFIED PLATFORM [UP]	84,702	84,702	
219	GEOBASE	2,723	2,723	
220	NUCLEAR PLANNING AND EXECUTION SYSTEM [NPES]	44,190	44,190	
226	AIR FORCE SPACE AND CYBER NON-TRADITIONAL ISR FOR BATTLESPACE AWARENESS	3,575	3,575	
227	E–4B NATIONAL AIRBORNE OPERATIONS CENTER [NAOC]	70,173	42,623	−27,550
228	MINIMUM ESSENTIAL EMERGENCY COMMUNICATIONS NETWORK	13,543	13,543	
229	HIGH FREQUENCY RADIO SYSTEMS	15,881	15,881	
230	INFORMATION SYSTEMS SECURITY PROGRAM	27,726	27,726	
232	GLOBAL FORCE MANAGEMENT—DATA INITIATIVE	2,210	2,210	
234	MULTI DOMAIN COMMAND AND CONTROL [MDC2]	150,880	110,880	−40,000
235	AIRBORNE SIGINT ENTERPRISE	102,667	102,667	
236	COMMERCIAL ECONOMIC ANALYSIS	3,431	3,431	
239	C2 AIR OPERATIONS SUITE—C2 INFO SERVICES	9,313	9,313	
240	CCMD INTELLIGENCE INFORMATION TECHNOLOGY	1,121	1,121	
241	ISR MODERNIZATION & AUTOMATION DVMT [IMAD]	19,000	19,000	
242	GLOBAL AIR TRAFFIC MANAGEMENT [GATM]	4,544	4,544	
243	WEATHER SERVICE	25,461	27,461	+2,000
244	AIR TRAFFIC CONTROL, APPROACH, & LANDING SYSTEM [ATC]	5,651	5,651	
245	AERIAL TARGETS	7,448	7,448	
248	SECURITY AND INVESTIGATIVE ACTIVITIES	425	425	
249	ARMS CONTROL IMPLEMENTATION	54,546	54,546	
250	DEFENSE JOINT COUNTERINTELLIGENCE ACTIVITIES	6,858	6,858	
252	INTEGRATED BROADCAST SERVICE	8,728	8,728	
253	DRAGON U–2	38,939	33,839	−5,100

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
254	ENDURANCE UNMANNED AERIAL VEHICLES		15,000	+15,000
255	AIRBORNE RECONNAISSANCE SYSTEMS	122,909	122,909	
256	MANNED RECONNAISSANCE SYSTEMS	11,787	11,787	
257	DISTRIBUTED COMMON GROUND/SURFACE SYSTEMS	25,009	25,009	
258	RQ–4 UAV	191,733	191,733	
259	NETWORK–CENTRIC COLLABORATIVE TARGET [TIARA]	10,757	10,757	
260	NATO AGS	32,567	32,567	
261	SUPPORT TO DCGS ENTERPRISE	37,774	37,774	
262	INTERNATIONAL INTELLIGENCE TECHNOLOGY AND ARCHITECTURES	13,515	13,515	
263	RAPID CYBER ACQUISITION	4,383	4,383	
264	PERSONNEL RECOVERY COMMAND & CTRL [PRC2]	2,133	2,133	
265	INTELLIGENCE MISSION DATA [IMD]	8,614	8,614	
266	C–130 AIRLIFT SQUADRON	140,425	101,425	−39,000
267	C–5 AIRLIFT SQUADRONS	10,223	10,223	
268	C–17 AIRCRAFT	25,101	25,101	
269	C–130J PROGRAM	8,640	8,640	
270	LARGE AIRCRAFT IR COUNTERMEASURES [LAIRCM]	5,424	5,424	
272	KC–10S	20	20	
274	CV–22	17,906	17,906	
276	SPECIAL TACTICS/COMBAT CONTROL	3,629	3,629	
277	DEPOT MAINTENANCE (NON-IF)	1,890	1,890	
278	MAINTENANCE, REPAIR & OVERHAUL SYSTEM	10,311	10,311	
279	LOGISTICS INFORMATION TECHNOLOGY [LOGIT]	16,065	16,065	
280	SUPPORT SYSTEMS DEVELOPMENT	539	539	
281	OTHER FLIGHT TRAINING	2,057	2,057	
282	OTHER PERSONNEL ACTIVITIES	10	10	
283	JOINT PERSONNEL RECOVERY AGENCY	2,060	2,060	
284	CIVILIAN COMPENSATION PROGRAM	3,809	3,809	
285	PERSONNEL ADMINISTRATION	6,476	4,376	−2,100
286	AIR FORCE STUDIES AND ANALYSIS AGENCY	1,443	1,443	
287	FINANCIAL MANAGEMENT INFORMATION SYSTEMS DEVELOPMENT	9,323	9,323	
288	DEFENSE ENTERPRISE ACNTNG AND MGT SYS [DEAMS]	46,789	42,789	−4,000
289	GLOBAL SENSOR INTEGRATED ON NETWORK [GSIN]	3,647	3,647	
290	SERVICE SUPPORT TO STRATCOM—SPACE ACTIVITIES	988	988	
291	SERVICE SUPPORT TO SPACECOM ACTIVITIES	11,863	11,863	
293	FAMILY OF ADVANCED BLOS TERMINALS [FAB-T]	197,388	177,388	−20,000
294	SATELLITE CONTROL NETWORK (SPACE)	61,891	56,891	−5,000
297	SPACE AND MISSILE TEST AND EVALUATION CENTER	4,566	4,566	
298	SPACE INNOVATION, INTEGRATION AND RAPID TECHNOLOGY DEVELOPMENT	43,292	38,292	−5,000
300	SPACELIFT RANGE SYSTEM (SPACE)	10,837	20,837	+10,000
301	GPS III SPACE SEGMENT	42,440	42,440	
302	SPACE SUPERIORITY INTELLIGENCE	14,428	14,428	
303	SPACE C2	72,762	72,762	
304	NATIONAL SPACE DEFENSE CENTER	2,653	2,653	
306	BALLISTIC MISSILE DEFENSE RADARS	15,881	15,881	
308	NUDET DETECTION SYSTEM (SPACE)	49,300	49,300	
309	SPACE SITUATION AWARENESS OPERATIONS	17,834	14,834	−3,000
310	GLOBAL POSITIONING SYSTEM III—OPERATIONAL CONTROL SEGMENT	445,302	445,302	
311	ENTERPRISE GROUND SERVICES	138,870	88,870	−50,000
	TOTAL, OPERATIONAL SYSTEMS DEVELOPMENT	6,499,982	6,594,996	+95,014
9999	CLASSIFIED PROGRAMS	18,029,506	17,616,691	−412,815
	TOTAL, RESEARCH, DEVELOPMENT, TEST & EVAL, AIR FORCE	45,616,122	45,446,727	−169,395

COMMITTEE RECOMMENDED ADJUSTMENTS

The following table details the adjustments recommended by the Committee:

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
1	Defense Research Sciences	356,107	406,107	+50,000
	Basic research program increase			+50,000
4	Materials	128,851	210,351	+81,500
	Program increase: Additive manufacturing			+20,000
	Program increase: Thermal protection for hypersonic vehicles			+10,000
	Program increase: High performance materials			+8,000
	Program increase: Minority leaders program			+8,500
	Program increase: Certification of advanced composites			+15,000
	Program increase: Advanced aerospace composite structures			+10,000
	Program increase: Coating technologies			+10,000
5	Aerospace Vehicle Technologies	147,724	157,724	+10,000
	Program increase: Hypersonic vehicle structures			+10,000
6	Human Effectiveness Applied Research	131,795	134,795	+3,000
	Program increase: Advanced technology development			+3,000
7	Aerospace Propulsion	198,775	219,775	+21,000
	Program increase: Next generation Hall thrusters			+14,000
	Program increase: Thermal management technologies			+7,000
8	Aerospace Sensors	202,912	214,912	+12,000
	Program increase: RF spectrum situational awareness			+12,000
14	Dominant Information Sciences and Methods	181,562	211,062	+29,500
	Program increase: Artificial intelligence/machine learning accelerator			+8,000
	Program increase: Combat cloud technology			+2,500
	Program increase: Quantum Computing Center of Excellence			+8,000
	Program increase: Quantum communications			+4,000
	Program increase: Quantum cryptography			+7,000
15	High Energy Laser Research	44,221	49,221	+5,000
	Program increase: Directed energy fiber lasers			+5,000
16	Space Technology	124,667	154,667	+30,000
	Program increase: Repurposed upper stage spacecraft bus			+10,000
	Program increase: Resilient space structure architecture			+15,000
	Program increase: Space situational awareness research			+5,000
17	Advanced Materials for Weapon Systems	36,586	50,086	+13,500
	Program increase: Advanced ballistic eyewear			+2,500
	Program increase: Artificial intelligence enhanced life cycle management			+2,000
	Program increase: Composites technology			+9,000
19	Advanced Aerospace Sensors	38,292	42,292	+4,000
	Program increase: Sensor integration to support ISR operations			+4,000
20	Aerospace Technology Dev/Demo	102,949	202,949	+100,000
	Program increase: Low cost attritable aircraft technology			+100,000
21	Aerospace Propulsion and Power Technology	113,973	155,973	+42,000
	Program increase: Silicon carbide research			+15,000
	Program increase: Chemical apogee engines			+5,000
	Program increase: Space propulsion technologies			+2,000
	Program increase: Upper stage engine technology			+20,000
23	Advanced Spacecraft Technology	70,525	80,525	+10,000
	Program increase: Radiation hardened memory			+10,000
28	Manufacturing Technology Program	43,116	105,716	+62,600
	Program increase: Materials development research			+5,000
	Program increase: F–35 battery technology			+9,800

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
	Program increase: Low cost manufacturing methods for hypersonic vehicle components			+8,000
	Program increase: Flexible hybrid electronics			+5,000
	Program increase: Aerospace composite structures			+5,000
	Program increase: Certification of bonded aircraft structures			+5,000
	Program increase: Industrialization of ceramic matrix composites for hypersonic weapons			+10,000
	Program increase: Thermal batteries			+4,800
	Program increase: Technologies to repair fastener holes			+5,000
	Program increase: Modeling technology for small turbine engines			+5,000
35	Pollution Prevention—Dem/Val		3,000	+3,000
	Program increase: Alternative energy aircraft tugs			+3,000
37	Advanced Engine Development	878,442	608,442	−270,000
	Maintain program affordability: Funding excess to need			−270,000
38	Long Range Strike—Bomber	3,003,899	2,898,099	−105,800
	Classified adjustment			−105,800
39	Directed Energy Prototyping	10,000	24,000	+14,000
	Program increase: Counter–UAS targeting solution			+14,000
43	National Airborne Ops Center [NAOC] Recap	16,669	12,669	−4,000
	Maintain program affordability: Unjustified growth			−4,000
44	Technology Transfer	23,614	27,614	+4,000
	Program increase: Technology partnerships			+4,000
48	Tech Transition Program	128,476	179,476	+51,000
	Program increase: Rapid sustainment office			+20,000
	Program increase: Reliable power for critical infrastructure			+6,000
	Program increase: Logistics technologies			+12,000
	Program increase: Small satellite manufacturing			+8,000
	Program increase: Directed energy experimentation			+5,000
49	Ground Based Strategic Deterrent	570,373	657,495	+87,122
	Program increase: Risk reduction			+65,100
	Air Force requested transfer from line 168			+22,022
50	Light Attack Armed Reconnaissance [LAAR] Squadrons	35,000	2,000	−33,000
	Restoring acquisition accountability: Unclear acquisition strategy			−33,000
51	Next Generation Air Dominance	1,000,000	960,000	−40,000
	Classified adjustment			−40,000
52	Three Dimensional Long–Range Radar [3DELRR]	37,290	23,190	−14,100
	Restoring acquisition accountability: Schedule slip			−14,100
57	Cyber Operations Technology Development	198,864	240,064	+41,200
	Program increase: Joint common access platform			+20,500
	Program increase: Cyber National Mission Force capability acceleration plan			+13,600
	Program increase: ETERNALDARKNESS			+7,100
61	Global Positioning System User Equipment (SPACE)	329,948	320,598	−9,350
	Maintain program affordability: Unjustified growth			−9,350
62	EO/IR Weather Systems	101,222		−101,222
	Transfer to SPAF: EO/IR weather			−101,222
63	Weather System Follow–on	225,660	205,660	−20,000
	Maintain program affordability: Unjustified growth			−20,000
64	Space Situation Awareness Systems	29,776	24,776	−5,000
	Maintain program affordability: Management services unjustified growth			−5,000
67	Space Control Technology	64,231	59,231	−5,000
	Improving funds management: Prior year carryover			−5,000
68	Space Security and Defense Program	56,385	46,385	−10,000
	Maintain program affordability: Unjustified growth			−10,000
70	Protected Tactical Service [PTS]	173,694	163,694	−10,000
	Maintain program affordability: Unjustified growth			−10,000
72	Space Rapid Capabilities Office	33,742	9,000	−24,742

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
	Program termination: ORS–8			−24,742
73	Future Advanced Weapon Analysis & Programs	246,200	5,000	−241,200
	Restoring acquisition accountability: Program termination			−241,200
77	Tactical Data Networks Enterprise	229,631	189,631	−40,000
	Improving funds management: Forward financed			−40,000
79	Small Diameter Bomb [SDB] —EMD	31,241	55,241	+24,000
	Program increase: Precise navigation			+4,000
	Program increase: Seeker cost reduction initiative			+20,000
80	Airborne Electronic Attack	2		−2
	Maintain program affordability: Unjustified request			−2
83	Agile Combat Support	19,944	26,944	+7,000
	Program increase: Multi–modal threat detection and mitigation			+7,000
85	Combat Training Ranges	37,365	52,365	+15,000
	Program increase: F–35 advanced threat simulator			+15,000
93	KC–46	59,561	94,561	+35,000
	Program increase: Boom telescope acuator			+35,000
94	Advanced Pilot Training	348,473	332,173	−16,300
	Improving funds management: Forward financed			−16,300
98	B–2 Defensive Management System	294,400	250,100	−44,300
	Maintain program affordability: Unjustified growth in management services			−34,300
	Restoring acquisition accountability: Test and evaluation funding early to need			−10,000
110	GPS III Follow–On [GPS IIIF]	462,875	447,875	−15,000
	Restoring acquisition accountability: Early to need			−15,000
111	Space Situation Awareness Operations	76,829	56,829	−20,000
	Restoring acquisition accountability: Forward financed			−20,000
114	Silent Barker	412,894	362,894	−50,000
	Restoring acquisition accountability: Phase II phasing			−50,000
117	Polar MILSATCOM (SPACE)	427,400	401,400	−26,000
	Restoring acquisition accountability: Prior year carryover			−26,000
120	Next Generation OPIR	1,395,278	1,930,778	+535,500
	Program increase			+535,500
122	National Security Space Launch Program (SPACE)—EMD	432,009	462,009	+30,000
	Program increase: Next Generation Rocket Engine Risk Reduction			+30,000
122A	Tactically Responsive Launch Operations		22,000	+22,000
	Program increase: Venture Class Launch Service			+22,000
124	Major T&E Investment	181,663	75,663	−106,000
	Program increase: Avionics cyber range			+5,000
	Transfer to Military Construction Appropriations bill for three projects utilizing the FY 2017 Defense Laboratory Modernization Pilot Program			−111,000
129	Acq Workforce- Global Power	258,667	255,667	−3,000
	Transfer: Air Force requested to RDTE line 134			−3,000
130	Acq Workforce- Global Vig & Combat Sys	251,992	249,992	−2,000
	Transfer: Air Force requested to RDTE line 134			−2,000
134	Acq Workforce- Capability Integration	220,255	228,255	+8,000
	Transfer: Air Force requested from RDTE lines 129, 130, and 135			+8,000
135	Acq Workforce- Advanced Prgm Technology	42,392	39,392	−3,000
	Transfer: Air Force requested to RDTE line 134			−3,000
140	Requirements Analysis and Maturation	62,715	80,715	+18,000
	Program increase: Nuclear deterrence research			+10,000
	Program increase: Nuclear modernization analytics			+8,000
142	ENTEPRISE INFORMATION SERVICES [EIS]	17,128	10,628	−6,500
	Improving funds management: Forward financed			−6,500
144	General Skill Training	1,475	6,475	+5,000

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
	Program increase: Integrated training and maintenance support systems			+5,000
152	Advanced Battle Management System [ABMS]	35,611	43,611	+8,000
	Program increase: Requirements refinement and technology identification			+8,000
157	F–35 C2D2	694,455	588,511	−105,944
	Maintain program affordability: Prior year execution delays			−105,944
164	B–52 Squadrons	325,974	329,974	+4,000
	Program increase: Global Strike Innovation Hub			+4,000
167	B–2 Squadrons	97,276	98,076	+800
	Program increase: B–2 training modernization			+10,000
	Restoring acquisition accountability: Airspace compliance schedule delay			−9,200
168	Minuteman Squadrons	128,961	104,219	−24,742
	Air Force requested transfer to line 49			−22,022
	Maintain program affordability: Launch Control Center Block Upgrade excess to need			−2,720
170	Worldwide Joint Strategic Communications	18,177	22,177	+4,000
	Program increase: NC3 architecture development			+8,000
	Maintain program affordability: Unjustified growth in the Strategic Automated Command and Control System Replacement program			−4,000
172	ICBM Reentry Vehicles	75,571	41,271	−34,300
	Restoring acquisition accountability: Change in acquisition strategy			−34,300
176	MQ–9 UAV	154,996	127,296	−27,700
	Maintain program affordability: Upgrade Program excess to need			−27,700
178	A–10 Squadrons	36,816	31,916	−4,900
	Improving funds management: Forward financed			−4,900
180	F–15E Squadrons	336,079	694,229	+358,150
	Program increase: GPS anti–jam technology			+10,000
	Maintain program affordability: Unjustified growth in the Mobile User Objective System			−16,250
	Transfer of two test aircraft and non–recurring engineering from APAF Line 3			+364,400
182	F–22A Squadrons	496,298	546,298	+50,000
	Transfer F–22A Modernization: AF requested from APAF Line 28			+50,000
189	Compass Call	15,888	31,888	+16,000
	Program increase: Accelerate EC–37B baseline 4 aircraft			+16,000
198	Tactical Air Control Party–Mod	6,217	4,117	−2,100
	Improving funds management: Forward financed			−2,100
211	AF Defensive Cyberspace Operations	16,609	44,109	+27,500
	Program increase: Critical infrastructure cyber security			+12,500
	Program increase: Cyber resilient space architecture			+15,000
227	E–4B National Airborne Operations Center [NAOC]	70,173	42,623	−27,550
	Restoring acquisition accountability: Unclear acquisition strategy			−27,550
234	Multi Domain Command and Control [MDC2]	150,880	110,880	−40,000
	Transfer: Air Force requested to OMAF SAG 11C			−40,000
243	Weather Service	25,461	27,461	+2,000
	Program increase: Research on atmospheric rivers			+2,000
253	Dragon U–2	38,939	33,839	−5,100
	Restoring acquisition accountability: Avionics tech refresh schedule delays			−5,100
254	Endurance Unmanned Aerial Vehicles		15,000	+15,000
	Program Increase: Ultra-long endurance aircraft			+15,000
266	C–130 Airlift Squadron	140,425	101,425	−39,000

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
	Maintain program affordability: Contract award savings			−39,000
285	Personnel Administration	6,476	4,376	−2,100
	Improving funds management: Forward financed			−2,100
288	Defense Enterprise Acntng and Mgt Sys [DEAMS]	46,789	42,789	−4,000
	Restoring acquisition accountability: Increment 1 schedule delay			−4,000
293	Family of Advanced BLoS Terminals [FAB–T]	197,388	177,388	−20,000
	Restoring acquisition accountability: FET schedule slip			−20,000
294	Satellite Control Network (SPACE)	61,891	56,891	−5,000
	Maintain program affordability: DCO–S unjustified growth			−5,000
298	Space Innovation, Integration and Rapid Technology Development	43,292	38,292	−5,000
	Restoring acquisition accountability: Forward financed			−5,000
300	Spacelift Range System (SPACE)	10,837	20,837	+10,000
	Program Increase: Space launch range services and capabilities			+10,000
309	Space Situation Awareness Operations	17,834	14,834	−3,000
	Restoring acquisition accountability: Contract award delay GSW			−3,000
311	Enterprise Ground Services	138,870	88,870	−50,000
	Restoring acquisition accountability: Contract award delay			−50,000
	Classified Programs	18,029,506	17,616,691	−412,815
	Classified adjustment			−412,815

Warfighter Physiological Performance.—The Committee recognizes that physiological performance is a key factor in warfighter mission readiness. The Committee supports efforts to utilize sensor technologies to monitor the physiological condition of warfighters but notes a capability gap in predicting operational human performance. The Committee encourages the Secretary of the Air Force to develop and refine physiological algorithms to provide measures of real-time human performance and operational readiness when accompanied with current and future sensor technologies.

Counter Unmanned Aerial Systems Research.—The Committee recognizes the critical importance of developing new technologies to detect and counter adversarial unmanned aerial systems [UAS] as individual or swarm threats. The Committee notes that countering UAS operations presents a special series of unmet communications, command and control, cyber, and computation and intelligence challenges at the tactical edge. The Committee encourages the Air Force Research Laboratory Information Directorate to continue research and development into the detection and countering of UAS using advanced technologies to facilitate geo-location detection, determine individual and swarm behavior, dissect swarms to identify critical nodes, situational awareness, and mission intent.

Thermal Protection Systems.—The Committee understands that thermal protection systems are critical for future hypersonic and space vehicles. The Secretary of the Air Force is encouraged to consider the production processes needed to manufacture such capa-

bilities and make key investments that will further develop and transition novel thermal protection systems into weapon systems.

Advanced Engine.—The fiscal year 2020 President's budget request includes $878,442,000 for the Adaptive Engine Transition Program [AETP]. The Committee continues to support research and development in the next generation of turbine engine technology that will provide fighter aircraft more thrust and range, while being more energy efficient. The Committee understands that the Department plans to conclude the AETP program in fiscal year 2021 with the ground testing of prototype engines. Despite the Committee encouraging the Air Force to identify current and future programs for this technology insertion (Senate Report 114–263), no programs, including the F–35 Joint Strike Fighter, are either signaling a demand for the next generation engine or budgeting appropriate resources to transition the engine in the future years defense program. Failure to transition the AETP program into production would constitute a severely missed opportunity to capitalize on more than $4,000,000,000 in research and development, and open the door to our adversaries to eclipse fielded U.S. engine technology in the coming years. The Committee finds these consequences to be unacceptable. Therefore, the Committee recommends a reduction of $270,000,000 to reflect the lack of a transition plan and directs the Secretary of the Air Force to provide, as part of the Department's fiscal year 2021 budget submission, a roadmap to transition the research and development accomplished under AETP and the previous Adaptive Engine Technology Development Program. The roadmap should clearly articulate the way forward with an advanced engine and provide updated cost, schedule, competition, and transition plans to other programs that will support advanced engine development, engineering and manufacturing development, and/or production activities.

Technology Transfer.—The Committee recognizes the importance of technology transfer between the Federal Government and non-Federal entities, such as academia, nonprofit organizations, and State and local governments. Technology transfer lowers the cost of new defense-related technology development and ensures that taxpayer investments in research and development benefit the economy and the industrial base. The Committee encourages the Secretary of Defense to continue support of technology transfer programs by allocating sufficient funding and leveraging the work being performed by Federal laboratories.

Light Attack Aircraft.—The fiscal year 2020 President's budget request includes $35,000,000 in research, development, test and evaluation funding to continue and expand the Light Attack Program experimentation campaign. The Air Force began to experiment with light attack aircraft in 2017 to consider ways to lessen the operational requirements of 4th and 5th generation fighter aircraft in more permissive and austere environments and to strengthen international partner capabilities, both goals supported in the 2018 National Defense Strategy. The Air Force determined that non-developmental, turbo-prop aircraft provided a low-cost and rapid fielding option, while supporting the intended mission sets of the experiment. Following the two experiments, it was also the Committee's understanding that the Air Force planned to leverage

section 804 authority to release a Request for Proposal [RFP] before the end of 2018, award a procurement contract for light attack aircraft before the end of 2019, and begin fielding a capability by fiscal year 2022. However, the RFP was never released, and the fiscal year 2020 President's budget requested funding to continue and expand the experiment but delayed procurement of aircraft to fiscal year 2022.

The Committee does not support a continued or expanded experiment and only recommends $2,000,000 in RDT&E funding to support the continued development of a secure and exportable tactical network, which compliments a light attack capability. If the Air Force wants to consider other platforms, such as rotary-wing or unmanned aircraft, neither of which tend to be exportable to foreign partners nor offset the need for high-end aircraft, the Committee encourages the Air Force to first develop a requirement, rather than rely on undefined experiments to determine a requirement.

The Committee recently supported a reprogramming request to shift prior year congressional add funding to the Aircraft Procurement, Air Force account in order for the Air Force to be able to execute its current plan to procure six turbo-prop aircraft with fiscal year 2018 and 2019 funding. The Committee directs the Secretary of the Air Force to carry out this plan and to provide necessary certifications of both types of turbo-prop aircraft used in the second experiment. Further, the Committee recommends an additional $210,000,000 in procurement funding to procure six additional turbo-prop aircraft and encourages the Air Force to revert back to the fiscal year 2019 plan and fund the acquisition program in fiscal year 2021 budget request. The Committee also directs the Secretary of the Air Force to submit a report to the congressional defense committees not later than 90 days after enactment of this act on a revised light attack aircraft program plan, to include updated costs, schedules, and procurement profiles as well as the intended missions to be supported with a light attack capability.

Advanced Battle Management System.—The Committee continues to support the Air Force's new approach to command and control in anti-access/area denial locations, the Advanced Battle Management System [ABMS]. The Committee notes the Air Force's efforts to outline the short, medium, and long-term phases of the program and establish an architect to oversee multiple programs across domains. The Committee supports the Air Force's long-term vision of resilient and survivable networks against near peer competitors. However, the Committee is concerned with the near-term requirements of the first phase, given disconnects between the Air Force's congressional reports on ABMS and the fiscal year 2020 budget request. Therefore, the Committee recommends an additional $8,000,000 for requirements refinement and technology identification.

Further, with the submission of the fiscal year 2021 budget request, the Committee directs the Secretary of the Air Force to submit a report summarizing all related programs in communications, battle management command and control, and sensors that fall within the ABMS umbrella across the future years defense program. The report should reference program element funding lines and clearly link all activities with funding lines in the fiscal year

2021 budget justification documents. It should also clearly articulate all phase one efforts, including initial operational capability timelines, the status of related legacy activities, and linkages to classified activities.

UH–1N Replacement Program.—The Committee supports the UH–1N Replacement Program that will replace the Air Force fleet of UH–1N aircraft with modern helicopters and close significant mission capability gaps, including range, speed, endurance, and troop capacity. The Committee is pleased that the Air Force awarded a UH–1N replacement procurement contract in 2018 to improve the security and surveillance of U.S. nuclear missile fields and nuclear weapons convoys as well as support the U.S. government continuity of operations mission in the National Capital Region. The Committee encourages the Air Force to maintain the current test and fielding plan to achieve an initial operational capability in 2023 and consider efforts to accelerate the schedule, when appropriate.

SPACE PROGRAMS

National Security Space Launch.—The Committee supports the Air Force's acquisition strategy for next generation launch vehicles and launch service procurement for National Security Space Launch as the best path forward for transitioning from the Russian RD–180 engine, increasing competition, and reducing launch costs, while maintaining assured access to space. In particular, the Committee supports the requirement that launch providers must be able to meet all national security space launch requirements, including the delivery into space of any national security payload designated by the Secretary of Defense or the Director of National Intelligence, as is codified in 10 U.S.C. 2273. The Committee is concerned that efforts to legislatively alter the competitive and transparent source selection process would undermine the integrity of the previously awarded Launch Service Agreement development contracts and risk delaying transition from the RD–180 engine and critical integration timelines of national security missions with new launch systems. Therefore, the Committee urges the Department to maintain the current acquisition schedule and mission performance requirements. The Committee opposes modifications to the Air Force strategy that would confine the Phase 2 launch service procurement to fewer than the planned 34 missions. Such a change would increase per-launch costs while simultaneously introducing risks and costs for certain national security payloads.

Next-Generation Overhead Persistent Infrared.—The Committee remains supportive of the Air Force's efforts to provide improved missile warning capabilities that are more survivable against emerging threats. However, the Committee is concerned that appropriately funding Next-Generation Overhead Persistent Infrared [Next-Gen OPIR] to achieve the program's rapid acquisition goals has not been a priority for the Department of Defense. While the AF requested $1,395,278,000, a substantial increase over the fiscal year 2019 budget of $643,126,000, the request was still more than $630,000,000 short of the full program need. The Committee believes the program will be a exemplar for rapid acquisition of space programs, whether the program succeeds or fails. Failure will have

implications for Congress's willingness to fund future programs using the National Defense Authorization Act section 804 rapid prototyping and fielding authorities for similarly large, or even middle tier programs, for years to come. Alternatively, if the program is to have any chance of success, the Department cannot continue to rely on reprogramming requests for its funding. Therefore the Committee recommends $1,930,778,000 for Next-Gen OPIR, an increase of $535,500,000. The Committee expects the Department to fully fund the program in fiscal year 2021. The Committee continues to designate Next-Gen OPIR as a congressional special interest item and continues to direct the Secretary of the Air Force to provide quarterly briefings to the congressional defense committees detailing progress against cost and schedule milestones.

Electro Optical/Infrared Weather Strategy.—The Committee is concerned about the Air Force's electro optical/infrared [EO/IR] weather acquisition strategy. After several years of fits and starts, the fiscal year 2019 budget request seemed to have a viable path forward for interim and long-term solutions to meet EO/IR weather gaps. Due to contract challenges with the interim solution, however, the Air Force abandoned the strategy as laid out in the fiscal year 2019 and 2020 budget submissions and recently submitted, informally, its latest plan, a distributed low earth orbit solution. While the Committee appreciates some aspects of this new acquisition plan, in particular, leveraging commercial investment via weather data as a service, the Committee is concerned about the Department's shift to what may be an overreliance on notional small satellite constellations for a variety of challenging acquisitions. No small satellite constellations currently exist and potential challenges with communications and ground systems have yet to be tested. Moreover the Committee has not been afforded the opportunity for a briefing on the new proposal and has many questions about the plans, timeline, and cost assumptions. Therefore, the Committee recommends a rescission of $74,400,000 from fiscal year 2019 and a reduction of $24,742,000 from fiscal year 2020 from Research, Test, Development, and Evaluation, Air Force, Space Rapid Capabilities Office for the terminated ORS–8 program, which was to be the interim EO/IR weather solution. In addition, the Committee recommends a transfer of $101,222,000 from Research, Test, Development, and Evaluation, Air Force, EO/IR Weather, to Space Procurement, Air Force, EO/IR Weather, for the procurement of an EO/IR weather sensor. The Committee welcomes additional discussion with the Air Force about its new acquisition strategy prior to conference discussion with the House Appropriations Committee.

Tactically Responsive Space Launch.—The Committee believes that demonstrating tactically responsive launch operations that leverage new and innovative commercial capabilities will enable Department of Defense space domain mission assurance and strategic deterrence objectives. A coherent tactically responsive launch concept of operations is needed to address tactics, techniques, and procedures and support operationally relevant satellite reconstitution demonstrations and pilot programs. Therefore, the Committee recommends establishment of a dedicated funding line for tactically responsive space launch to improve visibility and oversight of small launch funding and ensure the Department is focused on a pro-

gram for responsive, cost-effective small launch acquisition for evolving missions and future national security space objectives. Additionally, the Committee recommends an increase of $22,000,000 in Research, Development, Test and Evaluation, Air Force, Tactically Responsive Space Launch.

Inland Launch.—The Committee directs the Secretary of Defense to report, not later than 180 days after enactment of this act, on the feasibility, potential benefits and risks, and cost estimates of the establishment of an inland testing and space corridor for hypersonic testing and space launch. The report should give consideration to existing military test ranges and spaceports and shall identify known regulatory, statutory, or other impediments to using such facilities for launch or hypersonic testing.

RESEARCH, DEVELOPMENT, TEST AND EVALUATION, DEFENSE-WIDE

Appropriations, 2019	$23,691,836,000
Budget estimate, 2020	24,346,953,000
Committee recommendation	26,371,649,000

The Committee recommends an appropriation of $26,371,649,000. This is $2,024,696,000 above the budget estimate.

COMMITTEE RECOMMENDED PROGRAM

The following table summarizes the budget estimate for this appropriation, the Committee recommendation, and the Committee recommended adjustments to the budget estimate:

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
	RESEARCH, DEVELOPMENT, TEST & EVAL, DEFENSE-WIDE			
	BASIC RESEARCH			
1	DTRA UNIVERSITY STRATEGIC PARTNERSHIP BASIC RESEARCH ..	26,000	26,000	.....
2	DEFENSE RESEARCH SCIENCES	432,284	408,634	−23,650
3	BASIC RESEARCH INITIATIVES	48,874	118,874	+70,000
4	BASIC OPERATIONAL MEDICAL RESEARCH SCIENCE	54,122	45,092	−9,030
5	NATIONAL DEFENSE EDUCATION PROGRAM	92,074	100,074	+8,000
6	HISTORICALLY BLACK COLLEGES & UNIV [HBCU]	30,708	32,708	+2,000
7	CHEMICAL AND BIOLOGICAL DEFENSE PROGRAM	45,238	57,238	+12,000
	TOTAL, BASIC RESEARCH	729,300	788,620	+59,320
	APPLIED RESEARCH			
8	JOINT MUNITIONS TECHNOLOGY	19,306	19,306	.....
9	BIOMEDICAL TECHNOLOGY	97,771	92,771	−5,000
11	LINCOLN LABORATORY RESEARCH PROGRAM	52,317	52,317	.....
12	APPLIED RESEARCH FOR ADVANCEMENT S&T PRIORITIES	62,200	74,200	+12,000
13	INFORMATION AND COMMUNICATIONS TECHNOLOGY	442,556	414,390	−28,166
14	BIOLOGICAL WARFARE DEFENSE	34,588	34,588	.....
15	CHEMICAL AND BIOLOGICAL DEFENSE PROGRAM	202,587	204,687	+2,100
16	CYBER SECURITY RESEARCH	15,118	15,118	.....
17	TACTICAL TECHNOLOGY	337,602	313,002	−24,600
18	MATERIALS AND BIOLOGICAL TECHNOLOGY	223,976	214,976	−9,000
19	ELECTRONICS TECHNOLOGY	332,192	317,192	−15,000
20	WEAPONS OF MASS DESTRUCTION DEFEAT TECHNOLOGIES	179,096	174,096	−5,000
21	SOFTWARE ENGINEERING INSTITUTE	9,580	9,580	.....
22	SPECIAL OPERATIONS TECHNOLOGY DEVELOPMENT	40,569	40,569	.....
	TOTAL, APPLIED RESEARCH	2,049,458	1,976,792	−72,666
	ADVANCED TECHNOLOGY DEVELOPMENT			
23	JOINT MUNITIONS ADVANCED TECH INSENSITIVE MUNITIONS AD	25,779	25,779	.....
24	SO/LIC ADVANCED DEVELOPMENT	5,000	5,000	.....
25	COMBATING TERRORISM TECHNOLOGY SUPPORT	70,517	86,517	+16,000
26	FOREIGN COMPARATIVE TESTING	24,970	24,970	.....
28	COUNTERPROLIFERATION INITIATIVES—PROLIF PREV & DEFEAT	340,065	320,065	−20,000
29	ADVANCED CONCEPTS AND PERFORMANCE ASSESSMENT	14,208	41,201	+26,993
30	WEAPONS TECHNOLOGY	10,000	.....	−10,000
31	ADVANCED RESEARCH	20,674	20,674	.....
32	JOINT DOD-DOE MUNITIONS TECHNOLOGY DEVELOPMENT	18,773	18,773	.....
33	ADVANCED AEROSPACE SYSTEMS	279,741	279,741	.....
34	SPACE PROGRAMS AND TECHNOLOGY	202,606	172,606	−30,000
35	ANALYTIC ASSESSMENTS	19,429	19,429	.....
36	ADVANCED INNOVATIVE ANALYSIS AND CONCEPTS	37,645	37,645	.....
37	ADVANCED INNOVATIVE ANALYSIS AND CONCEPTS—MHA	14,668	14,668	.....
38	COMMON KILL VEHICLE TECHNOLOGY	13,600	13,600	.....
40	DEFENSE INNOVATION UNIT	29,398	29,398	.....
41	TECHNOLOGY INNOVATION	60,000	30,000	−30,000

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
42	CHEMICAL AND BIOLOGICAL DEFENSE PROGRAM—ADVANCED DEV	172,486	172,486	.....
43	RETRACT LARCH	159,688	159,688	.....
44	JOINT ELECTRONIC ADVANCED TECHNOLOGY	12,063	12,063	.....
45	JOINT CAPABILITY TECHNOLOGY DEMONSTRATIONS	107,359	89,859	−17,500
46	NETWORKED COMMUNICATIONS CAPABILITIES	2,858	2,858	.....
47	DEFENSE-WIDE MANUFACTURING SCIENCE AND TECHNOLOGY PROG	96,397	223,397	+127,000
48	MANUFACTURING TECHNOLOGY PROGRAM	42,834	52,834	+10,000
49	EMERGING CAPABILITIES TECHNOLOGY DEVELOPMENT	80,911	116,911	+36,000
50	GENERIC LOGISTICS R&D TECHNOLOGY DEMONSTRATIONS	10,817	12,217	+1,400
51	STRATEGIC ENVIRONMENTAL RESEARCH PROGRAM	66,157	66,157	.....
52	MICROELECTRONIC TECHNOLOGY DEVELOPMENT AND SUPPORT	171,771	206,771	+35,000
53	JOINT WARFIGHTING PROGRAM	4,846	4,846	.....
54	ADVANCED ELECTRONICS TECHNOLOGIES	128,616	111,616	−17,000
55	COMMAND, CONTROL AND COMMUNICATIONS SYSTEMS	232,134	231,134	−1,000
56	NETWORK-CENTRIC WARFARE TECHNOLOGY	512,424	486,824	−25,600
57	SENSOR TECHNOLOGY	163,903	158,903	−5,000
58	DISTRIBUTED LEARNING ADVANCED TECHNOLOGY DEVELOPMENT	13,723	13,723	.....
59	SOFTWARE ENGINEERING INSTITUTE	15,111	15,111	.....
60	QUICK REACTION SPECIAL PROJECTS	47,147	24,147	−23,000
61	ENGINEERING SCIENCE AND TECHNOLOGY	19,376	19,376	.....
62	HIGH ENERGY LASER ADVANCED TECHNOLOGY PROGRAM	85,223	85,223	.....
63	TEST & EVALUATION SCIENCE & TECHNOLOGY	175,574	191,574	+16,000
64	NATIONAL SECURITY INNOVATION NETWORK	25,000	25,000	.....
65	OPERATIONAL ENERGY CAPABILITY IMPROVEMENT	70,536	44,536	−26,000
66	CWMD SYSTEMS	28,907	.....	−28,907
68	SPECIAL OPERATIONS ADVANCED TECHNOLOGY DEVELOPMENT	89,154	103,154	+14,000
69	SPACE SCIENCE AND TECHNOLOGY RESEARCH AND DEVELOPMENT	20,000	20,000	.....
	TOTAL, ADVANCED TECHNOLOGY DEVELOPMENT	3,742,088	3,790,474	+48,386
	DEMONSTRATION & VALIDATION			
70	NUCLEAR AND CONVENTIONAL PHYSICAL SECURITY EQUIPMENT	42,695	42,695	.....
71	WALKOFF	92,791	92,791	.....
72	ACQUISITION ENTERPRISE DATA AND INFORMATION SERVICES	5,659	5,659	.....
73	ENVIRONMENTAL SECURITY TECHNICAL CERTIFICATION PROGRAM	66,572	68,572	+2,000
74	BALLISTIC MISSILE DEFENSE TERMINAL DEFENSE SEGMENT	302,761	306,761	+4,000
75	BALLISTIC MISSILE DEFENSE MIDCOURSE DEFENSE SEGMENT	1,156,506	1,360,616	+204,110
76	CHEMICAL AND BIOLOGICAL DEFENSE PROGRAM	83,662	80,162	−3,500
77	BALLISTIC MISSILE DEFENSE SENSORS	283,487	283,288	−199
78	BALLISTIC MISSILE DEFENSE ENABLING PROGRAMS	571,507	634,449	+62,942
79	SPECIAL PROGRAMS—MDA	377,098	512,098	+135,000
80	AEGIS BMD	727,479	723,639	−3,840
81	BALLISTIC MISSILE DEFENSE COMMAND AND CONTROL, BATTLE MANAGEMENT	564,206	549,756	−14,450
82	BALLISTIC MISSILE DEFENSE JOINT WARFIGHTER SUPPORT	51,532	51,532	.....
83	BALLISTIC MISSILE DEFENSE INTERGRATION AND OPERATIONS CENTER (MDIOC)	56,161	56,161	.....
84	REGARDING TRENCH	22,424	22,424	.....
85	SEA BASED X-BAND RADAR [SBX]	128,156	128,156	.....
86	ISRAELI COOPERATIVE PROGRAMS	300,000	300,000	.....
87	BALLISTIC MISSILE DEFENSE TEST	395,924	399,738	+3,814
88	BALLISTIC MISSILE DEFENSE TARGETS	554,171	611,939	+57,768
89	HUMANITARIAN DEMINING	10,820	10,820	.....
90	COALITION WARFARE	11,316	11,316	.....
91	DEPARTMENT OF DEFENSE CORROSION PROGRAM	3,365	11,165	+7,800
92	TECHNOLOGY MATURATION INITIATIVES	303,458	298,520	−4,938
93	MISSILE DEFEAT PROJECT	17,816	17,816	.....
95	HYPERSONIC DEFENSE	157,425	395,268	+237,843
96	ADVANCED INNOVATIVE TECHNOLOGIES	1,312,735	1,477,735	+165,000
97	TRUSTED AND ASSURED MICROELECTRONICS	542,421	542,421	.....

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
98	RAPID PROTOTYPING PROGRAM	100,957	50,957	−50,000
99	DEFENSE INNOVATION UNIT [DIU] PROTOTYPING	92,000	92,000	
100	DOD UNMANNED AIRCRAFT SYSTEM [UAS] COMMON DEVELOPMENT	3,021	7,021	+4,000
102	HOMELAND DEFENSE RADAR-HAWAII	274,714	173,548	−101,166
103	PACIFIC DISCRIMINATING RADAR	6,711	6,711	
104	WARGAMING AND SUPPORT FOR STRATEGIC ANALYSIS [SSA]	3,751	3,751	
105	DEFENSE RAPID INNOVATION PROGRAM	14,021	14,021	
107	JOINT C5 CAPABILITY DEVELOPMENT, INTEGRATION AND INTEROPERABILITY	20,062	20,062	
108	LONG RANGE DISCRIMINATION RADAR	136,423	136,423	
109	IMPROVED HOMELAND DEFENSE INTERCEPTORS	412,363	494,363	+82,000
110	BMD TERMINAL DEFENSE SEGMENT TEST	25,137	25,137	
111	AEGIS BMD TEST	169,822	169,822	
112	BALLISTIC MISSILE DEFENSE SENSOR TEST	105,530	105,530	
113	LAND-BASED SM–3 [LBSM3]	38,352	38,352	
115	BALLISTIC MISSILE DEFENSE MIDCOURSE DEFENSE SEGMENT TEST	98,139	98,139	
117	ENTERPRISE INFORMATION TECHNOLOGY SYSTEMS	1,600	1,600	
118	JOINT ELECTROMAGNETIC TECHNOLOGY [JET] PROGRAM	3,191	3,191	
119	CYBER SECURITY INITIATIVE	1,138	11,138	+10,000
120	SPACE TECHNOLOGY DEVELOPMENT AND PROTOTYPING	85,000	85,000	
121	SPACE TRACKING AND SURVEILLANCE SYSTEM	35,849	36,349	+500
122	BALLISTIC MISSILE DEFENSE SYSEM SPACE PROGRAMS	27,565	140,565	+113,000
	TOTAL, DEMONSTRATION & VALIDATION	9,797,493	10,709,177	+911,684
	ENGINEERING & MANUFACTURING DEVELOPMENT			
123	NUCLEAR AND CONVENTIONAL PHYSICAL SECURITY EQUIPMENT	11,276	11,276	
124	PROMPT GLOBAL STRIKE CAPABILITY DEVELOPMENT	107,000	107,000	
125	CHEMICAL AND BIOLOGICAL DEFENSE PROGRAM	384,047	373,814	−10,233
126	JOINT TACTICAL INFORMATION DISTRIBUTION SYSTEM [JTIDS]	40,102	52,602	+12,500
127	WEAPONS OF MASS DESTRUCTION DEFEAT CAPABILITIES	13,100	13,100	
128	INFORMATION TECHNOLOGY DEVELOPMENT	3,070	3,070	
129	HOMELAND PERSONNEL SECURITY INITIATIVE	7,295	7,295	
130	DEFENSE EXPORTABILITY PROGRAM	17,615	17,615	
131	OUSD(C) IT DEVELOPMENT INITIATIVES	15,653	5,653	−10,000
132	DOD ENTERPRISE SYSTEMS DEVELOPMENT AND DEMONSTRATION	2,378	1,628	−750
133	DCMO POLICY AND INTEGRATION	1,618	1,618	
134	DEFENSE AGENCY INITIATIVES FINANCIAL SYSTEM	27,944	27,944	
135	DEFENSE RETIRED AND ANNUITANT PAY SYSTEM [DRAS]	6,609	6,609	
136	DEFENSE-WIDE ELECTRONIC PROCUREMENT CAPABILITIES	9,619	9,619	
137	TRUSTED & ASSURED MICROELECTRONICS	175,032	175,032	
138	INFORMATION SYSTEMS SECURITY PROGRAM	425	425	
139	GLOBAL COMBAT SUPPORT SYSTEM	1,578	1,578	
140	DOD ENTERPRISE ENERGY INFORMATION MANAGEMENT [EEIM]	4,373	4,373	
141	CWMD SYSTEMS: SYSTEM DEVELOPMENT AND DEMONSTRATION	12,854	12,854	
	TOTAL, ENGINEERING & MANUFACTURING DEVELOPMENT	841,588	833,105	−8,483
	RDT&E MANAGEMENT SUPPORT			
142	JOINT CAPABILITY EXPERIMENTATION	13,000	13,000	
143	DEFENSE READINESS REPORTING SYSTEM [DRRS]	9,724	9,724	
144	JOINT SYSTEMS ARCHITECTURE DEVELOPMENT	9,593	9,593	
145	CENTRAL TEST AND EVALUATION INVESTMENT DEVELOPMENT	260,267	512,817	+252,550
146	ASSESSMENTS AND EVALUATIONS	30,834	30,834	
147	MISSION SUPPORT	68,498	68,498	
148	JOINT MISSION ENVIRONMENT TEST CAPABILITY [JMETC]	83,091	89,091	+6,000
149	TECHNICAL STUDIES, SUPPORT AND ANALYSIS	18,079	18,079	
150	JOINT INTEGRATED AIR AND MISSILE DEFENSE ORGANIZATION	70,038	70,038	
152	SYSTEMS ENGINEERING	37,140	37,140	
153	STUDIES AND ANALYSIS SUPPORT	4,759	4,759	
154	NUCLEAR MATTERS—PHYSICAL SECURITY	8,307	8,307	

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
155	SUPPORT TO NETWORKS AND INFORMATION INTEGRATION	9,441	9,441	
156	GENERAL SUPPORT TO USD (INTELLIGENCE)	1,700	1,700	
157	CHEMICAL AND BIOLOGICAL DEFENSE PROGRAM	110,363	110,363	
166	SMALL BUSINESS INNOVATION RESEARCH/TECHNOLOGY TRANSFER	3,568	3,568	
167	MAINTAINING TECHNOLOGY ADVANTAGE	19,936	19,936	
168	DEFENSE TECHNOLOGY ANALYSIS	16,875	15,875	−1,000
169	DEFENSE TECHNICAL INFORMATION CENTER [DTIC]	57,716	57,716	
170	R&D IN SUPPORT OF DOD ENLISTMENT, TESTING & EVALUATION	34,448	29,448	−5,000
171	DEVELOPMENT TEST AND EVALUATION	22,203	22,203	
172	MANAGEMENT HEADQUARTERS (RESEARCH & DEVELOPMENT)	13,208	13,208	
173	MANAGEMENT HEADQUARTERS DEFENSE TECHNICAL INFORMATION CENTER [DTIC]	3,027	3,027	
174	BUDGET AND PROGRAM ASSESSMENTS	8,017	8,017	
175	ODNA TECHNOLOGY AND RESOURCE ANALYSIS	3,194	3,194	
176	DEFENSE DIGITAL SERVICE [DDS] DEVELOPMENT SUPPORT	1,000	1,000	
179	DEFENSE OPERATIONS SECURITY [OPSEC]	3,037	8,037	+5,000
180	JOINT STAFF ANALYTICAL SUPPORT	9,216	9,216	
183	SUPPORT TO INFORMATION OPERATIONS [IO] CAPABILITIES	553	553	
184	DEFENSE MILITARY DECEPTION PROGRAM OFFICE	1,014	1,014	
185	COMBINED ADVANCED APPLICATIONS	58,667	48,667	−10,000
187	INTELLIGENCE CAPABILITIES AND INNOVATION INVESTMENTS	21,081	21,081	
189	ALGORITHMIC WARFARE CROSS FUNCTIONAL TEAMS	221,235	221,235	
191	COCOM EXERCISE ENGAGEMENT AND TRAINING TRANSFORMATION	40,073	40,073	
192	DEFENSE EQUAL OPPORTUNITY MANAGEMENT INSTITUTE [DEOMI]	100	100	
193	MANAGEMENT HEADQUARTERS—MDA	27,065	27,065	
194	JOINT SERVICE PROVIDER [JSP]	3,090	3,090	
9999	CLASSIFIED PROGRAMS	51,471	51,471	
	TOTAL, RDT&E MANAGEMENT SUPPORT	1,354,628	1,602,178	+247,550
	OPERATIONAL SYSTEMS DEVELOPMENT			
195	ENTERPRISE SECURITY SYSTEM [ESS]	7,945	7,945	
196	JOINT ARTIFICIAL INTELLIGENCE	208,834	208,834	
197	REGIONAL INTERNATIONAL OUTREACH & PARTNERSHIP FOR PEAC	1,947	1,947	
198	OVERSEAS HUMANITARIAN ASSISTANCE SHARED INFORMATION SY	310	310	
199	INDUSTRIAL BASE ANALYSIS AND SUSTAINMENT SUPPORT	10,051	116,051	+106,000
200	OPERATIONAL SYSTEMS DEVELOPMENT	12,734	12,734	
201	GLOBAL THEATER SECURITY COOPERATION MANAGEMENT	14,800	10,000	−4,800
202	CHEMICAL AND BIOLOGICAL DEFENSE (OPERATIONAL SYSTEMS D	54,023	51,834	−2,189
203	PLANNING AND DECISION AID SYSTEM	4,537	4,537	
204	C4I INTEROPERABILITY	64,122	64,122	
210	DEFENSE INFO INFRASTRUCTURE ENGINEERING & INTEGRATION	15,798	10,798	−5,000
211	LONG HAUL COMMUNICATIONS [DCS]	11,166	11,166	
212	MINIMUM ESSENTIAL EMERGENCY COMMUNICATIONS NETWORK	17,383	17,383	
214	KEY MANAGEMENT INFRASTRUCTURE [KMI]	54,516	54,516	
215	INFORMATION SYSTEMS SECURITY PROGRAM	67,631	31,631	−36,000
216	INFORMATION SYSTEMS SECURITY PROGRAM	289,080	344,198	+55,118
217	INFORMATION SYSTEMS SECURITY PROGRAM	42,796	44,678	+1,882
218	GLOBAL COMMAND AND CONTROL SYSTEM	25,218	17,218	−8,000
219	JOINT SPECTRUM CENTER (DEFENSE SPECTRUM ORGANIZATION)	21,698	21,698	
220	JOINT INFORMATION ENVIRONMENT [JIE]	18,077	18,077	
222	FEDERAL INVESTIGATIVE SERVICES INFORMATION TECHNOLOGY	44,001	44,001	
228	SECURITY AND INVESTIGATIVE ACTIVITIES	2,400	2,400	
232	POLICY R&D PROGRAMS	6,301	6,301	
233	NET CENTRICITY	21,384	21,384	
235	DISTRIBUTED COMMON GROUND/SURFACE SYSTEMS	6,359	6,359	
238	DISTRIBUTED COMMON GROUND/SURFACE SYSTEMS	2,981	2,981	
241	INSIDER THREAT	1,964	1,964	

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
242	HOMELAND DEFENSE TECHNOLOGY TRANSFER PROGRAM	2,221	2,221	.....
250	LOGISTICS SUPPORT ACTIVITIES	1,361	1,361	.....
251	PACIFIC DISASTER CENTERS	1,770	1,770	.....
252	DEFENSE PROPERTY ACCOUNTABILITY SYSTEM	3,679	3,679	.....
254	MQ–9 UAV	20,697	20,697	.....
256	SPECIAL OPERATIONS AVIATION SYSTEMS ADVANCED DEV	245,795	250,395	+4,600
257	SPECIAL OPERATIONS INTELLIGENCE SYSTEMS DEVELOPMENT	15,484	15,484	.....
258	SOF OPERATIONAL ENHANCEMENTS	166,922	150,154	−16,768
259	WARRIOR SYSTEMS	62,332	68,470	+6,138
260	SPECIAL PROGRAMS	21,805	21,005	−800
261	UNMANNED ISR	37,377	37,377	.....
262	SOF TACTICAL VEHICLES	11,150	11,150	.....
263	SOF MARITIME SYSTEMS	72,626	69,126	−3,500
264	SOF GLOBAL VIDEO SURVEILLANCE ACTIVITIES	5,363	5,363	.....
265	SOF OPERATIONAL ENHANCEMENTS INTELLIGENCE	12,962	12,962	.....
266	SOF TELEPORT PROGRAM	6,158	6,158	.....
300	NEXT GENERATION INFORMATION COMMUNICATIONS TECHNOLOGY	.....	436,000	+436,000
	TOTAL, OPERATIONAL SYSTEMS DEVELOPMENT	1,715,758	2,248,439	+532,681
999	CLASSIFIED PROGRAMS	4,116,640	4,422,864	+306,224
	TOTAL, RESEARCH, DEVELOPMENT, TEST & EVAL, DEF-WIDE	24,346,953	26,371,649	+2,024,696

COMMITTEE RECOMMENDED ADJUSTMENTS

The following table details the adjustments recommended by the Committee:

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
2	Defense Research Sciences	432,284	408,634	−23,650
	Improving funds management: Program delays			−23,650
3	Basic Research Initiatives	48,874	118,874	+70,000
	Program increase: DEPSCOR			+12,000
	Program increase: Cyber research			+8,000
	Program increase: Basic research			+50,000
4	Basic Operational Medical Research Science	54,122	45,092	−9,030
	Improving funds management: Program delays			−9,030
5	National Defense Education Program	92,074	100,074	+8,000
	Program increase: Submarine workforce development			+8,000
6	Historically Black Colleges and Universities/Minority Institutions	30,708	32,708	+2,000
	Program increase: Aerospace education, research and innovation center			+2,000
7	Chemical and Biological Defense Program	45,238	57,238	+12,000
	Program increase: Smallpox antiviral post-exposure prophylaxis			+12,000
9	Biomedical Technology	97,771	92,771	−5,000
	Improving funds management: Program delays			−5,000
12	Applied Research for the Advancement of S&T Priorities	62,200	74,200	+12,000
	Program increase: PFAS modeling			+7,000
	Program increase: Test center for quantum communications and sensors			+5,000
13	Information & Communications Technology	442,556	414,390	−28,166
	Improving funds management: Program delays			−13,166
	Improving funds management: Unjustified increase			−15,000
15	Chemical and Biological Defense Program	202,587	204,687	+2,100
	Program increase: Coatings technologies			+2,100
17	Tactical Technology	337,602	313,002	−24,600
	Improving funds management: Program delays			−14,600
	Improving funds management: Prior year carryover			−10,000
18	Materials and Biological Technology	223,976	214,976	−9,000
	Improving funds management: Program delays			−9,000
19	Electronics Technology	332,192	317,192	−15,000
	Improving funds management: Program delays			−15,000
20	Counter Weapons of Mass Destruction Applied Research	179,096	174,096	−5,000
	Improving funds management: Unjustified growth			−5,000
25	Combating Terrorism Technology Support	70,517	86,517	+16,000
	Program increase: Bomb squad robot retrofitting			+3,000
	Program increase: Cooperative C–UAS development			+13,000
28	Counter Weapons of Mass Destruction Advanced Technology Development	340,065	320,065	−20,000
	Maintain program affordability: Unjustified growth			−20,000
29	Advanced Concepts and Performance Assessment	14,208	41,201	+26,993
	Program increase: Cybersecurity of MDA DV left and right of launch			+22,500
	Program increase: Cybersecurity			+4,493
30	Weapons Technology	10,000		−10,000
	Restoring acquisition accountability: MD72 program termination			−10,000
34	Space Programs and Technology	202,606	172,606	−30,000
	Improving funds management: RSGS program delays			−30,000
41	Technology Innovation	60,000	30,000	−30,000
	Improving funds management: Prior year carryover			−30,000
45	Joint Capability Technology Demonstrations	107,359	89,859	−17,500
	Improving funds management: Unjustified growth			−17,500
47	Defense-Wide Manufacturing Science and Technology Program	96,397	223,397	+127,000
	Program increase: Accelerated rapid prototyping			+17,000
	Program increase: Manufacturing cybersecurity			+14,000
	Program increase: HPC-enabled advanced manufacturing			+17,000

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
	Program increase: Advanced structural manufacturing			+9,000
	Program increase: Silicon based lasers			+25,000
	Program increase: Manufacturing enginering education program			+45,000
48	Manufacturing Technology Program	42,834	52,834	+10,000
	Program increase: Steel Perforance Initiative			+10,000
49	Emerging Capabilities Technology Development	80,911	116,911	+36,000
	Program increase: Open source inteligence			+3,000
	Program increase: Remote advise and assist technology development			+8,000
	Program increase: Disruptive air and missile defense			+5,000
	Program increase: Artificial intelligence enabled sensor network			+10,000
	Program increase: High-altitude optical reconnaissance unit and sensors			+10,000
50	Generic Logistics R&D Technology Demonstrations	10,817	12,217	+1,400
	Improving funds management: Prior year carryover			−3,600
	Program increase: Liquid hydrocarbon fuels			+5,000
52	Microelectronics Technology Development and Support	171,771	206,771	+35,000
	Program increase: Cyber accelerator			+30,000
	Program increase: GaN-on-Sibased RF Front-end			+5,000
54	Advanced Electronics Technologies	128,616	111,616	−17,000
	Improving funds management: Program delays			−17,000
55	Command, Control and Communications Systems	232,134	231,134	−1,000
	Improving funds management: Program delays			−10,000
	Program increase: Commercial satellite antenna technology			+9,000
56	Network-Centric Warfare Technology	512,424	486,824	−25,600
	Improving funds management: Program delays			−25,600
57	Sensor Technology	163,903	158,903	−5,000
	Improving funds management: Program delays			−5,000
60	Quick Reaction Special Projects	47,147	24,147	−23,000
	Improving funds management: Prior year carryover			−23,000
63	Test & Evaluation Science & Technology	175,574	191,574	+16,000
	Program increase: Test resource management center			+16,000
65	Operational Energy Capability Improvement	70,536	44,536	−26,000
	Reduce duplication: Space solar power project			−30,000
	Program increase			+4,000
66	CWMD Systems	28,907		−28,907
	Reduce duplication			−28,907
68	SOF Advanced Technology Development	89,154	103,154	+14,000
	Program increase: Identity management			+14,000
73	Environmental Security Technical Certification Program	66,572	68,572	+2,000
	Program increase: Technology demonstration program			+2,000
74	Ballistic Missile Defense Terminal Defense Segment	302,761	306,761	+4,000
	Program increase: Cybersecurity			+4,000
75	Ballistic Missile Defense Midcourse Defense Segment	1,156,506	1,360,616	+204,110
	RKV program termination: Transfer from line 109 to GBI CE–I reliability SLEP only			+180,000
	Program increase: Cybersecurity			+24,110
76	Chemical and Biological Defense Program—Dem/Val	83,662	80,162	−3,500
	Improving funds management: Program delays (VAC VEE)			−2,000
	Improving funds management: Program delays (MPD)			−1,500
77	Ballistic Missile Defense Sensors	283,487	283,288	−199
	Restoring acquisition accountability: MD11 Modeling and simulation development unjustified growth			−21,993
	Program increase: Cybersecurity			+20,294
	Program increase: Models and simulation unfunded requirement			+1,500
78	BMD Enabling Programs	571,507	634,449	+62,942
	Program increase: Cybersecurity			+62,942
79	Special Programs—MDA	377,098	512,098	+135,000
	Program increase: Classified			+135,000
80	AEGIS BMD	727,479	723,639	−3,840

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
	Restoring acquisition accountability: BMD 5.1 baseline unjustified growth			−29,630
	Improving funds management: AEGIS underlay funds early to need			−2,000
	RKV program termination funding transfer: AEGIS upgrades			+19,000
	Program increase: Cybersecurity			+8,790
81	Ballistic Missile Defense Command and Control, Battle Management and Communications	564,206	549,756	−14,450
	Restoring acquisition accountability: Increment 7 growth early to need			−33,300
	Program increase: Cybersecurity			+18,850
87	Ballistic Missile Defense Test	395,924	399,738	+3,814
	Program increase: Cybersecurity			+3,814
88	Ballistic Missile Defense Targets	554,171	611,939	+57,768
	Improving funds management: MRBM target contract award delays			−11,232
	Program increase: HEMP hardening			+69,000
91	Department of Defense Corrosion Program	3,365	11,165	+7,800
	Program increase: Coatings technologies			+5,000
	Program increase: Military painter training and applied research			+2,800
92	Technology Maturation Initiatives	303,458	298,520	−4,938
	Unclear budget justification: Flight test			−4,938
95	Hypersonic Defense	157,425	395,268	+237,843
	Program increase: Glide Phase Defeat Weapon System			+25,000
	Program increase: Engineering enablers			+57,858
	Program increase: Leverage and upgrade existing systems			+43,942
	Program increase: Fiscal year 2020 partnered fight test participation			+111,043
96	Advanced Innovative Technologies	1,312,735	1,477,735	+165,000
	Maintain program affordability: unjustified program growth			−80,000
	Program increase: Hypervelocity Gun Weapon system			+80,000
	Program increase: Micro Nuclear Reactor Program			+140,000
	Program increase: Machine learning			+10,000
	Program increase: Expandable rotocraft diagnostics for Army aviation test center			+15,000
98	Rapid Prototyping Program	100,957	50,957	−50,000
	Reduce duplication			−50,000
100	Department of Defense (DoD) Unmanned System Common Development	3,021	7,021	+4,000
	Program increase: Unmanned traffic management			+4,000
102	Homeland Defense Radar—Hawaii (HDR–H)	274,714	173,548	−101,166
	Improving funds management: Radar foundation and thermal control system			−41,166
	Improving funds management: Funding acceleration early to need			−60,000
109	Improved Homeland Defense Interceptors	412,363	494,363	+82,000
	RKV program termination: Transfer excess RKV funds to line 75 for GBI CE–I reliability/SLEP only			−140,000
	RKV program terminiation: Transfer RKV funds to Next Generation Interceptor program			−222,363
	RKV program termination: Transfer to Next Generation Interceptor program from RKV program funds			+222,363
	RKV program termination: Next Generation Interceptor Competitive Development			+222,000
119	Cyber Security Initiative	1,138	11,138	+10,000
	Program increase: Cheyenne Mountain cyber resilience efforts			+10,000
121	Space Tracking & Surveillance System	35,849	36,349	+500
	Program increase: Cybersecurity			+500
122	Ballistic Missile Defense System Space Programs	27,565	140,565	+113,000

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
	Program increase: Hypersonic and ballistic tracking space sensor development			+108,000
	Program increase: Cybersecurity			+5,000
125	Chemical and Biological Defense Program—EMD	384,047	373,814	−10,233
	Improving funds management: Program delays (ROCS)			−4,500
	Improving funds management: Program delays (MMPRDS)			−2,533
	Improving funds management: Program delays (CALS)			−2,500
	Improving funds management: Program delays (SSA)			−700
126	Joint Tactical Information Distribution System [JTIDS]	40,102	52,602	+12,500
	Program increase: Integrated Kinetic and Non-Kinetic Nodal Analysis Capability Enhancement			+12,500
131	OUSD(C) IT Development Initiatives	15,653	5,653	−10,000
	Improving funds management: Prior year carryover			−10,000
132	DOD Enterprise Systems Development and Demonstration	2,378	1,628	−750
	Improving funds management: Prior year carryover			−750
145	Central Test and Evaluation Investment Development [CTEIP]	260,267	512,817	+252,550
	Program increase: Hypersonics—ground testing in support of National Defense Strategy			+91,250
	Program increase: Hypersonics—flight test infrastructure in support of National Defense Strategy			+14,000
	Program increase: Space test infrastructure in support of National Defense Strategy			+50,000
	Program increase: Directed energy infrastructure in support of National Defense Strategy			+40,000
	Program increase: Cyber infrastructure in support of National Defense Strategy			+40,000
	Program increase: Defense Threat Center of Excellence			+17,300
148	Joint Mission Environment Test Capability [JMETC]	83,091	89,091	+6,000
	Program increase			+6,000
168	Defense Technology Analysis	16,875	15,875	−1,000
	Improving funds management: Prior year carryover			−4,000
	Program increase: Technology transition			+3,000
170	R&D in Support of DoD Enlistment, Testing and Evaluation	34,448	29,448	−5,000
	Maintain program affordability: unjustified growth			−5,000
179	Defense Operations Security Initiative [DOSI]	3,037	8,037	+5,000
	Program increase: Cyber kinetic combat environment			+5,000
185	Combined Advanced Applications	58,667	48,667	−10,000
	Classified adjustment			−10,000
199	Industrial Base Analysis and Sustainment Support	10,051	116,051	+106,000
	Program increase: Machine and advanced manufacturing			+20,000
	Program increase: Automated textile manufacturing			+10,000
	Program increase: Precision optics			+6,000
	Program increase: Interdisciplinary center for advanced manufacturing systems			+15,000
	Program increase: Rare earth elements from coal ash			+5,000
	Program increase: Defense manufacturing communities			+50,000
201	Global Theater Security Cooperation Management Information Systems [G-TSCMIS]	14,800	10,000	−4,800
	Maintain program affordability: unjustified growth			−4,800
202	Chemical and Biological Defense (Operational Systems Development)	54,023	51,834	−2,189
	Improving funds management: Program delays (SSA)			−700
	Improving funds management: Program delays (ALS MOD)			−500
	Improving funds management: Program delays (MODPROT)			−500
	Improving funds management: Program delays (JBAIDS)			−489
210	Defense Info Infrastructure Engineering and Integration	15,798	10,798	−5,000
	Improving funds management: Prior year carryover			−5,000
215	Information Systems Security Program	67,631	31,631	−36,000
	Maintan program affordability: Unjustified growth			−36,000
216	Information Systems Security Program	289,080	344,198	+55,118
	DOD requested transfer to Line 217: Sharkseer			−1,882
	Program increase: Centers for Academic Excellence			+12,000

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
	Program increase: Workforce transformation cyber security initiative pilot			+25,000
	Program increase: Cyber scholarships for senior military colleges			+10,000
	Program increase: Cyber security pathfinders			+10,000
217	Information Systems Security Program	42,796	44,678	+1,882
	DOD requested transfer from Line 216: Sharkseer			+1,882
218	Global Command and Control System	25,218	17,218	−8,000
	Improving Funds Management: Prior year carryover			−8,000
256	Aviation Systems	245,795	250,395	+4,600
	SOCOM requested transfer from PDW, Line 61: RFCM			+8,400
	Program increase: Aviation Systems, Future Vertical Lift			+8,800
	Improving funds management: HEL ground test early to need			−7,000
	Improving funds management: Unjustified growth (ITMS)			−5,600
258	Operational Enhancements	166,922	150,154	−16,768
	Classified Adjustment			−16,768
259	Warrior Systems	62,332	68,470	+6,138
	Improving Funds Management: Prior year carryover			−5,000
	Improving funds management: Unjustified growth (C–UAS)			−3,000
	Improving funds management: NGLS excess to need			−862
	Program increase: SGM collaborative strike enhancement			+15,000
260	Special Programs	21,805	21,005	−800
	Classified Adjustment			−4,000
	Program increase: Enhanced visual augmentation system			+3,200
263	Maritime Systems	72,626	69,126	−3,500
	Insufficient budget justification: Poor justification materials [DCS]			−6,500
	Program increase: Driver propulsion device			+3,000
300	NEXT GENERATION INFORMATION COMMUNICATIONS TECHNOLOGY (5G)		436,000	+436,000
	Program increase			+436,000
999	Classified Programs	4,116,640	4,422,864	+306,224
	Classified adjustment			+303,224
	Program increase: Transport access control			+3,000

Strategic Capabilities Office.—Since its inception, the Committee has been supportive of the Strategic Capabilities Office [SCO], which uses existing weapons systems in new ways to counter near peer adversaries. The Committee believes that such focus on near term solutions to counter threats and responsiveness to the needs of the Combatant Commands is vital, however, the Committee shares concerns from within the Department of Defense that SCO's ability to successfully transition programs to service partners and ensure that programs meet requirements needs improvement. The Committee understands that the Department is conducting a review of SCO's prior year budgets and the fiscal year 2020 budget submission, including all current SCO projects and 2020 new starts. The Committee always welcomes a reevaluation of budget priories and oversight of programs within the Department, but notes that revisiting program decisions a month prior to the start of the fiscal year challenges effective congressional budget oversight. Therefore, the Committee directs the Secretary of Defense to provide the congressional defense committees with the findings of the program review, including metrics on transition success, and a funding realignment plan, by November 1, 2019. In addition, the Committee directs the Secretary to provide to the congressional de-

fense committees, quarterly obligation and expenditure reports for SCO by project. Finally, the Secretary shall report to the congressional defense committees with recommendations for enhancing SCO's ability to transition programs and ensure that programs within the SCO portfolio are optimized to meet Department of Defense requirements. Recommendations shall include changes that can be made within the current SCO organizational structure, but may include options for a broader reorganization. The report shall include the views of each Combatant Command on the recommendations.

User Activity Monitoring.—The Committee remains concerned about insider threats to Department of Defense information systems and appreciates the Department's effort to establish a task force to develop an approach to user activity monitoring [UAM] across the Department and identify challenges and necessary resources to implement the approach. The Committee urges the Department to expedite these UAM efforts and establish a program that provides UAM coverage of all employees with access to classified networks. The Committee also directs that the Chief Information Officer report to the Committee not later than 90 days after the enactment of this act, the findings of the task force to date, including the timeline to initiate a program for comprehensive UAM coverage across the Department beginning in fiscal year 2020; a recommended governance structure for managing execution of such a program; any obstacles identified to establishing such a program to include legal, financial, contractual, or cultural issues; identification of the resources required to implement the program in fiscal year 2020; and an explanation of how the program complies with all relevant provisions of Executive Order 13587 and CNSS Directive 504.

Cyber Education.—The Committee supports efforts by the Department of Defense and National Security Agency to reduce the vulnerability of our national information infrastructure by promoting higher education and research in cyber defense and producing professionals with cyber defense expertise. Therefore, the Committee recommends an increase in Research, Development, Test and Evaluation, Defense-Wide of $12,000,000 for the National Centers for Academic Excellence Cyber Defense program. The Committee recommends an additional increase of $25,000,000 for the establishment of a workforce development pilot program that would offer certificate-based courses through the Centers for Academic Excellence in cybersecurity and artificial intelligence. Finally, the Committee recommends $10,000,000 to fund an initiative authorized in the John S. McCain National Defense Authorization Act for Fiscal Year 2019, for the Secretary of Defense to designate Department of Defense Cyber Institutes at institutions of higher education, with consideration to the Senior Military Colleges, to award scholarships, student and research support, and a K–12 cyber education program.

Cyber Professionals From Minority Communities.—The Committee is aware of the significant need for attracting well qualified individuals with cyber training to aid the nation against adversarial cyber threats. The Committee encourages the Department of Defense and the intelligence community to review opportunities to

grow its workforce by focusing future recruitment in underrepresented populations and minority communities and to work with qualified historically black colleges and universities to identify and recruit the next generation of cyber professionals.

Manufacturing Innovation Institutes.—The Committee continues to support the Manufacturing Innovation Institutes, but notes that the Department of Defense lacks a comprehensive approach to integrating the institutes into each service's future year's research agenda. Therefore, the Committee directs the Secretary of Defense to provide a briefing not later than 90 days after the enactment of this act, describing a plan for sustained investment in the Manufacturing Innovation Institutes, including integration with the military services to facilitate transition of advanced manufacturing capabilities into fielded systems and programs of record.

Manufacturing Engineering Programs.—The Committee recognizes that the United States must maintain a technically trained workforce to meet the defense industrial base requirements of the Department of Defense. Therefore, the Committee recommends an additional $45,000,000 above the fiscal year 2020 President's budget request for manufacturing engineering grants and encourages the Secretary of Defense to prioritize funding under this program to support community colleges and technical schools.

Micro Nuclear Reactors.—The Strategic Capabilities Office [SCO] of the Department of Defense has initiated studies and analysis to determine the feasibility and safety of developing a transportable nuclear reactor to better satisfy the logistics and other power needs of Department of Defense expeditionary basing, humanitarian assistance, and disaster relief operations. The Committee supports SCO's initial efforts to develop preliminary engineering plans, address key technical and manufacturing weaknesses, and build initial safety and licensing documentation. The Committee recommends an additional $140,000,000 in Research, Development, Test, and Evaluation; Defense-Wide to expedite efforts toward a final engineering design.

Precision Optics.—The Committee is aware that there are challenges within the precision optical systems supply chain to include increased competition from overseas suppliers, a shortage of later-stage research and development investments, and a shrinking skilled workforce. The Committee recognizes that stable later-stage development of innovative optical materials and optical manufacturing technologies is required. Additional efforts should be made to stabilize the industry and provide for optics technician training programs in key geographical regions to insure a future technical workforce for the industry.

Cheyenne Mountain Cyber Resiliency Efforts.—The Committee notes the criticality of the Cheyenne Mountain Complex to U.S. national security, including ballistic missile defense operations, as well as the increasing cyber threat. Therefore, the Committee recommends $10,000,000 for industrial control systems cyber security solutions for key Department of Defense installations critical to homeland defense and overseas operations, with special emphasis on the Cheyenne Mountain Complex.

OPERATIONAL TEST AND EVALUATION, DEFENSE

Appropriations, 2019	$381,009,000
Budget estimate, 2020	221,200,000
Committee recommendation	232,700,000

The Committee recommends an appropriation of $232,700,000. This is $11,500,000 above the budget estimate.

COMMITTEE RECOMMENDED PROGRAM

The following table details the adjustments recommended by the Committee:

[In thousands of dollars]

Line	Item	2020 budget estimate	Committee recommendation	Change from budget estimate
1	Operational Test and Evaluation	93,291	93,291	
2	Live Fire Test and Evaluation	69,172	69,172	
3	Operational Test Activities and Analyses	58,737	70,237	+11,500
	Program increase: Advanced satellite navigation receiver			+10,000
	Program increase: Cyber talent recruitment initiative			+1,500
	Total, Operational Test and Evaluation, Defense	221,200	232,700	+11,500

Testing for Rapid Prototyping and Rapid Fielding Programs.—The Director, Operational Test and Evaluation, in coordination with the Under Secretary of Defense (Acquisition and Sustainment) and the Under Secretary of Defense (Research and Engineering), and with the cooperation of the respective service test organizations, is directed to provide to the congressional defense committees, concurrently with the fiscal year 2021 President's budget request, an assessment of test strategies for all current and proposed acquisition programs using section 804 acquisition authorities. This assessment shall include a review of test sufficiency, scope, realism, data to be collected, as well as resources required to conduct this testing.

Cyber Talent Recruitment Initiative.—The Committee notes continued weaknesses in the Department of Defense's cyber posture, to include challenges in the recruitment and retention of qualified cyber talent. Therefore, the Committee recommends the Department of Defense consider implementing a pilot program to provide scholarships through qualified institutions of higher education, including community colleges, to students who are enrolled in programs that lead to degrees or specialized program certifications in the cybersecurity field that support Department of Defense requirements. The Committee believes that the Department could benefit from such a program and partnership with universities to create a cyber talent pipeline that develops a cyber workforce. The Committee recommends $1,500,000 to develop a program that identifies university partners and a structure to award scholarships to build a certified cyber defense workforce.