GAO

Briefing Report to the Chairman, Committee on Armed Services, House of Representatives

July 1987

PROCUREMENT

Inertial Measurement Units for Peacekeeper Missiles

GAO/NSIAD-87-194BR

GAO

United States
General Accounting Office
Washington, D.C. 20548

National Security and
International Affairs Division

B-223636

July 31, 1987

The Honorable Les Aspin
Chairman, Committee on Armed Services
House of Representatives

Dear Mr. Chairman:

As requested in your letter dated April 23, 1987, we have reviewed the Air Force's acquisition of inertial measurement units (IMUs), a component of the Peacekeeper missile guidance and control system. Northrop Electronics Division, under contract to the Air Force's Ballistic Missile Office, manufactures the IMU. On July 16, 1987, we briefed your office on the status of IMU delivery delays, IMU failures, IMU operational status, and missile status and accuracy. This briefing report summarizes that meeting. We are continuing our review and will report in final at a later date. Additional information on these issues is included in appendixes I through V.

DELAYS IN IMU DELIVERY

As of June 30, 1987, Northrop Electronics Division had manufactured 35 developmental (exclusive of engineering models) and 45 production IMUs, of which almost all were delivered late. All of the 45 production IMUs were delivered late, with the average delay being 128 days. In response to these delays, the Air Force, in April 1986 began withholding partial progress payments and, in March 1987, began withholding full progress payments. Northrop expects to be back on contract schedule in February 1988. To reach this goal, Northrop will have to deliver six IMUs each month from May 1987 to January 1988. This rate is higher than previously required, but Northrop achieved this rate in May and June 1987.

The Air Force believes it is realistic to expect the contractor to deliver four units each month. Deliveries at this rate would result in recovery to contract schedule in October 1988.

IMU FAILURES

As of June 30, 1987, 45 production and 2 full-scale development IMUs were scheduled for installation in operational missiles. These 47 IMUs have had 40 failures -- 19 in operational missiles and 21 prior to installation in missiles. Twelve of the 40 failures were repeat failures, that is, the same IMU failed more than once. Consistent with Air Force practices, the Ballistic Missile Office monitors and reports IMU reliability on the basis of failures occurring only after installation in operational missiles. Based on this data, the Ballistic Missile Office is reporting that IMU reliability is better than anticipated.

Failures prior to installation in operational missiles occurred at Rockwell Autonetics during IMU integration into the guidance system and at F. E. Warren Air Force Base during final acceptance testing. Of the 21 preoperational failures, 11 were caused by an interface problem, which was corrected by a production design change.

IMU OPERATIONAL STATUS

As of June 30, 1987, the status of the 47 Northrop delivered IMUs scheduled for installation in operational missiles was as follows.

--14 are installed in operational missiles,
-- 4 are at F. E. Warren Air Force Base for use as spares,
-- 4 are in acceptance testing,
-- 5 are being used to support test activities,
--16 are being repaired,
-- 3 are at Northrop to support production, and
-- 1 was expended on flight test missile #16.

MISSILE STATUS AND ACCURACY

As of June 30, 1987, a total of 22 Peacekeeper missiles had been turned over to the Strategic Air Command. Fourteen missiles are in an operational status and 8 missiles are not operational due to shortages of IMUs. As indicated above, there are up to 13 IMUs designated for spares or testing. They could be used in a national emergency to bring additional Peacekeepers to operational status.

There have been 17 Peacekeeper test flights. According to the Air Force, the accuracy demonstrated by the flight test missiles has been better than the design requirement. This accomplishment should, however, be considered within the following perspective. The first eight flight tests were launched from ground level sites. Beginning with flight test number 9, the missiles were launched from a silo and results, while still within requirements, were not as good as the first eight flights. The impact points among the nine test flight missiles launched from a silo were more dispersed and the accuracy was not as good. The Air Force is currently attempting to identify why the accuracy was less than that achieved when missiles were launched from ground level sites. They plan to test any identified corrective actions during the final three developmental flight tests.

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We performed our work during May and June 1987, in accordance with generally accepted government auditing standards. We obtained information from the Ballistic Missile Office and the Northrop Electronics Division. We discussed this report with officials at Air Force Headquarters and the Ballistic Missile Office and have included their comments as appropriate. However, due to time constraints, we were unable to obtain contractor comments. As requested, we did not obtain official Department of Defense comments.

As arranged with your office, unless you publicly announce its contents earlier, we will not distribute this report until 30 days after its issue date. At that time, copies will be made available to appropriate congressional committees; the Secretaries of Defense and the Air Force; the Director, Office of Management and Budget; and other interested parties. If you have any questions, please contact me at 275-4268.

Sincerely yours,

Harry R. Finley
Senior Associate Director

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IMU CONTRACT SUMMARY

Contract number	Date effective	Purpose	Amount (millions)	Total IMUs
F04704-80-C-0003	12/19/79	Full-Scale Engr. Dev. I	$ 384.3	23[a]
F04704-83-C-0023	06/15/83	Full-Scale Engr. Dev. II	525.6	18[a]
F04704-84-C-0041	04/04/84	Production Buy A[b]	339.3	52
F04704-85-C-0082	06/20/86	Production Buy B[b]	164.6	30
F04704-86-C-0198	03/30/87	Production Buys C/D[b]	188.5	31
Total			$1,602.3	154[c]

[a]Includes three engineering models.

[b]The IMU unit prices for production buys A, B, and C/D are about $4.7 million, $4.2 million, and $5.8 million, respectively. Remaining contract costs are for supplying hardware and services.

[c]The Ballistic Missile Office plans to acquire a total of 239 IMUs.

APPENDIX II

DELINQUENCIES IN DELIVERING IMUs UNDER THE FIRST PRODUCTION CONTRACT
(as of June 30, 1987)

IMU no.	Delivery dates		Days late
	Contract	Actual	
P1	10/25/85	05/16/86	203
P2	11/29/85	06/30/86	213
P3	12/27/85	07/03/86	188
P4	01/24/86	08/15/86	203
P5	01/31/86	07/31/86	181
P6	02/21/86	08/21/86	181
P7	02/28/86	08/21/86	174
P8	03/21/86	09/02/86	165
P9	03/28/86	08/22/86	147
P10	04/18/86	10/21/86	186
P11	04/25/86	09/12/86	140
P12	05/23/86	10/17/86	147
P13	05/30/86	11/29/86	183
P14	06/20/86	10/03/86	105
P15	06/27/86	10/16/86	111
P16	07/18/86	11/11/86	116
P17	07/25/86	11/04/86	102
P18	08/15/86	11/11/86	88
P19	08/22/86	02/28/87	190
P20	08/29/86	12/17/86	110
P21	09/12/86	11/21/86	70
P22	09/19/86	12/17/86	89
P23	09/26/86	12/18/86	83
P24	10/17/86	12/23/86	67
P25	10/24/86	01/12/87	80
P26	10/31/86	01/23/87	84
P27	11/07/86	02/11/87	96
P28	11/14/86	02/03/87	81
P29	11/21/86	04/24/87	154
P30	11/28/86	03/12/87	104
P31	12/05/86	03/25/87	110
P32	12/12/86	06/10/87	180
P33	12/26/86	05/29/87	154
P34	12/29/86	02/28/87	61
P35	01/09/87	04/30/87	111
P36	01/16/87	05/19/87	123
P37	01/23/87	05/28/87	125
P38	01/30/87	05/13/87	103
P39	02/06-87	05/30/87	113
P40	02/13/87	05/28/87	104

APPENDIX II

IMU no.	Delivery dates Contract	Actual	Days late
P41	02/20/87	06/30/87	130
P42	02/27/87	06/17/87	110
P43	03/06/87	06/17/87	103
P44	03/13/87	06/25/87	104
P45	03/20/87	06/30/87	102
P46	03/27/87	07/18/87	113
P47	04/03/87	07/19/87	107
P48	04/10/87	07/21/87	102
P49	04/17/87	07/10/87	84
P50	04/24/87	07/23/87	90
P51	05/08/87	07/26/87	79
P52	05/15/87	07/27/87	73
Average days late for all units			123.5

Note: As of June 30, 1987, IMUs P1 through P45 were delivered an average of 128 days late.

Delivery dates for IMU P46 through P52 are planned, not actual.

APPENDIX III

MONTHLY AND CUMULATIVE DELINQUENCIES IN DELIVERING IMUs
(as of June 30, 1987)

Month	Deliveries[a]		Cumulative deliveries		Cumulative difference
	Contract	Actual/Planned	Contract	Actual/Planned	
1985					
March	1	0	1	0	-1
April	1	0	2	0	-2
May	1	0	3	0	-3
June	1	0	4	0	-4
July	1	0	5	0	-5
August	1	0	6	0	-6
September	1	0	7	0	-7
October	2	1	9	1	-8
November	2	1	11	2	-9
December	2	2	13	4	-9
1986					
January	2	0	15	4	-11
February	2	1	17	5	-12
March	2	1	19	6	-13
April	2	1	21	7	-14
May	2	2	23	9	-14
June	2	2	25	11	-14
July	2	2	27	13	-14
August	3	6	30	19	-11
September	4	1	34	20	-14
October	4	4	38	24	-14
November	5	5	43	29	-14
December	5	4	48	33	-15
1987					
January	5	2	53	35	-18
February	5	4	58	39	-19
March	4	2	62	41	-21
April	4	2	66	43	-23
May	4	6	70	49	-21
June	3	6	73	55	-18
July	3	6	76	61	-15
August	3	6	79	67	-12
September	5	6	84	73	-11
October	4	6	88	79	-9
November	5	6	93	85	-8
December	2	6	95	91	-4

APPENDIX III

Month	Deliveries[a] Contract	Deliveries[a] Actual/Planned	Cumulative deliveries Contract	Cumulative deliveries Actual/Planned	Cumulative difference
1988					
January	3	6	98	97	-1
February	2	3	100	100[b]	0

[a]Deliveries contain 10 developmental units configured as production units.

[b]Based on its estimates, Northrop projects that in February 1988 actual deliveries will be in line with contract delivery requirements.

APPENDIX IV

IMU FAILURES
(as of June 30, 1987)

Cause of failure	Operational	Preoperational	Total
Government-furnished SFIR/TGG[a]	9	2	11
Northrop IMU	10	19	29
Total	19[b]	21	40

[a]The Specific Force Integrating Receiver (SFIR) and the Third Generation Gyroscope (TGG) are critical instruments in the IMU.

[b]The Ballistic Missile Office reported 16 IMU failures; GAO has included 3 additional failures that occurred but were not verified until July 1987.

DELINQUENCIES IN DELIVERING FULL-SCALE DEVELOPMENT IMUs
(as of June 30, 1987)

IMU number	Configuration	Delivery dates		Days late	Average days late
		Contractual	Actual		
4	601	10/31/82	10/27/82	-4	
5	601	11/30/82	11/30/82	0	
6	601	12/31/82	12/16/82	-15	
7	601	02/28/82	02/28/82	0	- 4.8
8	602	03/31/83	04/20/83	20	
9	602	03/31/83	07/29/83	120	
10	602	04/30/83	09/14/83	137	
11	602	05/31/83	10/31/83	153	
12	602	06/30/83	02/07/84	222	
13	602	07/31/83	12/17/83	139	
14	602	09/30/83	12/30/83	91	
15	602	11/30/83	02/06/84	68	
16	602	12/31/83	02/28/84	59	
17	602	01/31/84	04/27/84	87	
18	602	02/29/84	03/31/84	31	
19	602	03/31/84	05/15/84	45	
20	602	04/30/84	03/31/84	-30	
21	602	05/31/84	04/27/84	-34	79.1
22	603	06/30/84	08/03/84	34	
23	603	07/31/84	12/04/84	126	
24	603	09/30/84	10/20/84	20	
25	603	11/30/84	01/24/85	55	
26	603	12/20/84	02/15/85	57	
27	603	01/30/85	03/11/85	40	
28	603	02/28/85	08/30/85	183	73.6
29	604/605	03/31/85	10/08/85	191	
30	604/605	04/30/85	12/11/85	225	
31	604/605	05/31/85	11/25/85	178	
32	604/605	06/30/85	12/31/85	184	
33	604/605	07/30/85	03/01/86	214	
34	604/605	08/31/85	04/21/86	233	
35	604/605	09/30/85	02/08/86	131	
36	604/605	10/31/85	05/03/86	184	192.5
37	605	11/30/85	08/11/86	254	
38	605	12/20/85	06/26/86	188	221.0

Note: IMUs 4, 5, 6, 7, 20, and 21 were delivered on time or ahead of schedule. This listing excludes 3 engineering models--IMUs 1, 2, and 3.

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