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NORTH ATLANTIC COUNCIL

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INFRASTRUCTURE COMMITTEE

REPORT BY THE WORKING GROUP OF NATIONAL COMMUNICATIONS EXPERTS ON TROL CRYPTOGRAPHIC REQUIREMENTS

Memorandum by the International Staff

At its meeting on 9th March, 1965 the Infrastructure Committee requested the Working Group to advise whether all or only a part of the telegraphic circuits will be terminated with TROL machines and also to estimate the number of TROL equipments that will be needed (AC/4-R/493, Item VII and AC/4-D/1764, paragraph 20(c)). A preliminary report by the Working Group, in response to this request, was submitted in paragraph II of the Annex to AC/4-WP/329.

2. The Working Group has now been provided by SHAPE with a revised list of circuits to be equipped with TROL machines (SHAPE 6550.1/23-37 of 15th June, 1965). This list was screened during the Working Group's meeting from 5th-10th July, 1965(1). Out of a total number of 4,053 equipments which SHAPE considered were necessary, the Working Group considered that 2,520 were required, excluding requirements of most mobile war headquarters elements which the Working Group tentatively estimated at about 20% of the number recommended. Details regarding the number of equipments requested and the number recommended are shown in the table at Annex A hereto.

3. The Working Group took account of the following factors in carrying out its study(2):

(a) SHAPE had largely based its request on existing circuits in the 1965 military budgets. However, the Working Group considered it prudent to ascertain that these circuits met the new criteria of eligibility (C-M(65)39 and C-M(65)47) which have subsequently been approved by the Council. This resulted in the elimination of some circuits for which TROL equipments were requested;

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(1) For a list of those attending see Annex B.

(2) The Norwegian Expert has submitted a further statement, attached as Annex C.

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(b) in determining the number of equipments required, the number of terminal equipments held is a more important factor than the number of circuits. As noted in the previous report, many circuits may exist or may be planned between two headquarters A and B to give alternative routings, but only one set of terminal equipment may be provided for each end and, in such a case, only one set of cryptographic equipment would be recommended for each terminal. The Working Group discovered that commands had frequently requested TROL equipments for circuits that would only be brought into use if other circuits were no longer available. The equipments for these circuits including "leap-frog" circuits were eliminated by the Working Group. Commands had moreover duplicated requirements for a headquarters in a single fixed location (A) when establishing the circuits from A to another headquarters (B) in several different locations (peacetime B1, main war B2, alternative war B3). By providing three equipments in A, it would be possible to communicate simultaneously with B1, B2 and B3, but often the operational requirement could be met by providing one equipment at A to enable it to communicate with whichever location of B was active, and, here again, the Working Group suggested reductions which SHAPE accepted;

(c) for a small number of circuits, the Working Group was unable to decide whether or how many equipments could be recommended. These cases mainly concerned pony circuits within certain headquarters, for which the Working Group felt further information on traffic volumes was needed, or circuits to units that could not be adequately identified at the meeting. SHAPE has, however, agreed that any additional equipments which may be necessary as a result of further study of these undecided cases would be met from the contingency allowance which the Working Group recommends (see (f) below) and would not entail a revision of the recommended number of 2,520 equipments;

(d) SHAPE has requested equipments for meteorological circuits. Some members of the Working Group questioned the necessity for equipping these circuits with the same type of machine as other point-to-point circuits, but SHAPE has since confirmed the requirement on the basis of MC 69. The Working Group's recommendation has therefore been adjusted to include the equipments needed for accepted meteorological circuits;

(e) equipments for tactical use (mainly for shore-ship radio) have been excluded from the present study;

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(f) since the rôle and composition of mobile elements of war headquarters is not yet well defined, the Working Group excluded from its recommendation equipments requested for such elements, with the exception of those for presently-constituted mobile units of headquarters. Rather than attempt a calculation of doubtful validity, the Working Group recommended that a fixed percentage of 25% should be added to the programmed cost to cover the requirements of unforeseen cases, mobile elements transportation and spares, plus a 5% allowance to meet costs of training after the first year.

4. It has not been proposed that NATO should finance equipments at national terminals more than one echelon below recognised NATO headquarters (except, for instance, on circuits in the Nuclear Strike Plan to strike airfields, circuits to SAS depots and circuits for facilities which have been accepted for NATO funding (maritime airfields or the ALLA/NALLA network)), and the Working Group has in consequence eliminated equipments on circuits between two national units. However, certain problems still remain in this connexion which may be summarised as follows:

- what is the definition of a "recognised NATO Headquarters"? Does it include only those headquarters listed in C-M(61)31(Revised), or does it also include the headquarters listed in the Standing Group's publication "NATO Military Command and Organization Charts" (latest edition dated 22nd April, 1965) and headquarters given NATO wartime status in the MC 68 series? Also, is an advanced component of a headquarters to be considered as the headquarters itself? (e.g. COMPAIRWINGNORLANT, a SACLANT wartime headquarters, which is located in ACE at Bodoe);

- should NATO finance in common the provision of equipments at terminals which are lower than "one echelon below NATO recognised headquarters" but which would be used by more than one nation in time of war? SHAPE has, for example, included the Leros, Salamis, Souda Bay and Amasra naval bases as "national terminals" which could be eligible for common financing and SACLANT has included naval installations under Flag Officer Clyde similarly;

- should NATO finance in common the provision of equipments at purely national relay stations or switching centres which may be used as the most economical way of communicating under the concept of "nearest suitable entry point" with (for example) an SAS depot which would qualify for commonly-funded TROL equipment? The Working Group understands that in the past host nations have provided at no extra cost to NATO equipment at such stations required to maintain the NATO circuit, but it seems that host nations may be reluctant or unable to provide TROL equipments ensuring the encryption of messages to their NATO terminal.

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5. The Working Group does not feel that the answers to the questions in paragraph 4 above would call for any modification in the number of equipments now recommended, but points out that answers will be required before SHAPE can begin to fit circuits. The Working Group moreover suggests that it be instructed to check the circuits that SHAPE proposes to equip, immediately prior to the machines becoming available, so as to ensure that only those terminals are fitted which qualify for common financing.

6. SHAPE has assured the Experts that it will vary the number of machines to be bought to take account of upward or downward changes in requirements. The Working Group would not expect upward changes to be necessary; on the contrary, it would expect that, especially if the Area Grid System is adopted, there would be reductions in the number of machines to be bought.

7. The Working Group also examined at the same meeting SACLANT's and CINCHAN's proposed lists of circuits to be equipped with TROL machines. Provision was made in Slice XIII at an estimate of £741,000 to meet the requirements of these commands, but, as noted in paragraph 9 of AC/4-D/1764, this estimate is now obviously insufficient. The object of the Working Group in screening the commands' current requirements was to arrive at a more realistic number of equipments, and therefore a more accurate cost estimate.

8. SACLANT requested 570 point-to-point equipments, including a 10% allowance for spares (50 equipments), together with eight equipments for tactical use. The Working Group disregarded the latter category and, after distinguishing between "NATO" and "national" terminals recommended a total of 446 equipments (394 duplex and 52 simplex), of which it considered that 262 duplex and 39 simplex were for use in NATO terminals and 132 duplex and 13 simplex were for national terminals. On this basis, the cost of equipping SACLANT is estimated as follows:

197 duplex terminals at £7,000 each	£1,379,000
52 simplex terminals at £5,000 each	260,000
	£1,639,000
+ 25% for contingencies, mobiles, transportation and spares	410,000
	£2,050,000(1)
+ approximately 5% for training after first year	150,000
TOTAL	£2,200,000

(1) Rounded up

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9. CINCHAN requested 90 point-to-point equipments (56 simplex and 54 duplex). After study, the Working Group recommended 87 equipments (35 simplex, 52 duplex, of which 31 simplex were considered to be for NATO terminals and four for national terminals and all 52 duplex being considered as for NATO terminals). This gives the following cost estimate for CINCHAN:

26 duplex terminals at £7,000 each	£182,000
35 simplex terminals at £5,000 each	175,000
	£357,000
+ 25% for contingencies, mobiles and spares	89,000
	£446,000
+ 5% for training after first year	24,000
	£470,000

10. The total estimate for SACLANT and CINCHAN therefore amounts to £2,596,000, as compared to the estimate of £3,049,000 submitted by SACLANT (including CINCHAN) for Project 6 of SACLANT's recommended Slice XVII Programme. The Slice XVII proposal it should be noted, includes provision of tactical equipment, which has been excluded from the Working Group's present study.

Conclusions

11. The Working Group recommends:

(a) that not all telegraph circuits need be equipped with TROL equipments;

(b) that on present requirements, SHAPE's needs be evaluated at 2,520 equipments, excluding equipments for mobile elements and pony circuits;

(c) that for the purposes of assessing the cost of meeting SHAPE's requirements, a 25% allowance should be added to the cost of these equipments on the lines indicated in Annex A, and an additional 5% for training after the first year.

(d) that the Committee provide answers to the questions set out in paragraph 4 above, and that it instruct the Working Group to verify that the terminals at which SHAPE in due course proposes to install equipments all qualify for commonly-funded equipments;

(e) that the Committee decide what action (if any) is called for in relation to war headquarters for which cryptographic equipment is included in the programmed estimate and for which procurement action has been suspended;

(f) that the estimates contained in paragraphs 8-10 above be considered in making financial provision for the cost of equipments in the SACLANT and CINCHAN commands.

(Signed) G. CIONI
Chairman
Working Group of National
Communication Experts

OTAN/NATO,
Paris, XVIe.

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I. ACE REQUIREMENTS BY COMMANDS - NATO EQUIPMENTS

(a) Command	(b) SHAPE's Request			(c) Working Group's Recommendation		
	(d) Simplex	(e) Duplex	(f) Total	(g) Simplex	(h) Duplex	(i) Total
SHAPE	48	274	322	87	192	279
AFNORTH	49	176	225	44	120	164
AFCENT	377	538	915	204	300	504
AFSOUTH	177	642	819	100	290	390
AFILD	40	300	340	18	82	100
Totals	691	1,930	2,621	453	984	1,437

II. ACE REQUIREMENTS FOR NATIONAL EQUIPMENTS

Command	SHAPE's Request			Working Group's Recommendation		
	Simplex	Duplex	Total	Simplex	Duplex	Total
SHAPE	67	60	127	21	44	65
AFNORTH	51	152	203	48	112	160
AFCENT	278	190	468	198	142	340
AFSOUTH	153	384	537	111	178	289
AFILD	33	64	97	41	188	260
Totals	582	850	1,432	419	664	1,083

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III. COST SUMMARY

SHAPE's Request	
1,390 duplex terminals at £7,000	£ 9,730,000
1,273 simplex terminals at £5,000	6,365,000
	£16,095,000
+ 10% transportation	1,609,500
+ 10% installation	1,609,500
+ 5% training	804,750
+ 10% contingencies	1,609,500
	£21,728,250

Working Group's Recommendation:	
824 duplex terminals	£ 5,768,000
872 simplex terminals	4,360,000
	£10,128,000
+ 25% contingencies, mobile requirements, transportation and spares	2,532,000
	£12,660,000
+ 5% training after first year	640,000
	£13,300,000

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ANNEX B to
AC/4-D/I/15

ATTENDANCE LIST FOR WORKING GROUP OF
NATIONAL COMMUNICATIONS EXPERTS

Meeting of 5th to 10th July, 1965

Mr. C. Cioni	International Staff Chairman
Lt. Col. J.M. Mairiaux	Belgium
Mr. H.E. Schack Andersen	Denmark
Col. J. Krause) Lt. Col. Decker)	Germany
Lt. Col. B. Castelli	Italy
Lt. Col. F.T. Steiginga	Netherlands
Lt. Col. F. Olsvik	Norway
Wg. Cdr. (Retd.) H.H. Laurie	United Kingdom
Col. Cloutier	United States
Capt. H.M. Avery	SACLANTREPEUR
Cdr. Barber	CINCHAN
Major D. Goodman	SHAPE
Mr. J.D. McBain	Secretary

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STATEMENT BY THE NORWEGIAN EXPERT

The Infrastructure Committee should be advised that, in arriving at its recommendations, the Working Group accepted equipments at the following locations:

MODs (as national terminals for connexions to recognised NATO headquarters)

National logistics installations (as national terminals)

National territorial defence forces (as national terminals)

NALLAs (as NATO terminals for international circuits)

Maritime airfields (as NATO terminals)