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MEMORY ADMINISTRATION

NETWORK ADMINISTRATION

1 ESS™ SWITCH

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1. GENERAL

1.01 This practice provides the network administrator with recommended methods and procedures for the administration of the 1ESS program store (PS).

1.02 This practice was reissued to include unlinked words on the word usage summary worksheet PSV-4. Figures 4, 11 and associated PSV-4 text were updated to reflect this change.

1.03 The title for each figure includes a number(s) in parentheses which identifies the paragraph(s) in which the figure is referenced.

1.04 This practice describes the tasks required for memory administration. The following documents will provide more detailed information:

- IM-1A001, Input Message Manual
- OM-1A001, Output Message Manual
- Traffic Order
- TG-1A, Translation Guide
- PG-1, Parameter Guide

2. MEMORY DESCRIPTION

A. Program Store Memory

2.01 Program Store (PS) memory is composed of three memory areas: Generic Program, Parameters and Translations.

2.02 Each PS frame is equipped with 16 modules (MODS), 8 for memory storage and 8 for duplication. Each MOD contains 8192 words. Consequently, each PS frame provides 65536 duplicated words of Memory (8 MODS X 8192 words per MOD).

B. Program Store Module Duplication

2.03 Program store information is fully duplicated for service protection, and either central control has access to both sets of data. Each store is divided into two halves, called H and G. Each half consists of eight memory modules.

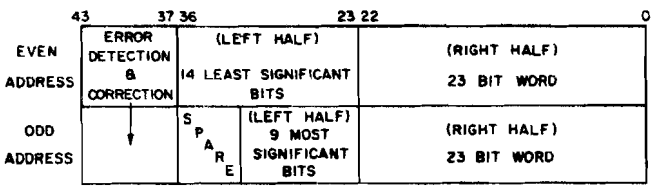
C. Program Store Generic and Parameter Words

2.04 The program store word is 44 bits long. Generic and parameter words contain 37 bits (0-36). Error detection and correction use the remaining 7 bits (37-43).

D. Program Store Translation Words

2.05 Some translation items use a 14 bit translation word. They include office code translations and lists - i.e., speed calling lists They usually occupy the left half part of the PS word (bits 23-36) but may also appear in the right half (bits 0-22). However, if used as a right half 14 bit word, 9 bits of the 23 bit word are wasted.

2.06 Most translation items use a 23 bit translation word. They can be stored in either the right half (bits 0-22) of a 37 bit PS word or the left half (14 bits) of two consecutive PS words.



3. MEMORY ADMINISTRATION RESPONSIBILITIES

3.01 Proper memory administration requires that memory be used efficiently and that space be available, as required. Improper administration can cause early exhausting of space, which in turn could result in frame additions or costly memory rearrangements.

3.02 The memory of a 1ESS switch has a finite capacity. The network administrator must ensure that this capacity will last through the end of the engineered period. This is done by management of the translations area. Therefore, certain translation area administration goals should be recognized. These goals are based on the overall goal of ensuring the efficient use of the translations area of the 1ESS switch and are as follows:

- Ensure accurate translations
- Conserve memory space
- Monitor the utilization of memory space

3.03 This section recommends certain routine and special tasks to be performed in administering translation memory. Some general checks are required for memory administration. These checks involve:

- Abbreviated Class Code Efficiency and Translation Form Accuracy
- Memory Utilization and Capacity
- Parameter Set Card Adequacy

A. Abbreviated Class Code Efficiency and Translation Form Accuracy

3.04 **Abbreviated codes** (Translation Forms 1502 and 1503) provide an important method of conserving words. For a new office, the abbreviated code objective for the cutover is 95 percent or better for both lines and directory numbers. The network administrator must strive to maintain as high an abbreviation level as possible. It is recommended that all subsequent main station additions to the office have at least an 80 percent overall abbreviation rate for all lines and directory numbers and 95 percent abbreviation efficiency for

lines and directory numbers that **can** be abbreviated.

3.05 **Translation forms** for the office must be kept current and must be posted accurately. Otherwise, any translation problems encountered may be difficult to resolve, and large areas of memory may be used needlessly. All work groups handling translation forms must ensure that their forms are accurate.

3.06 The percent abbreviation should be checked annually (unless circumstances dictate a semi-annual check also). An annual review of the translation forms 1502 and 1503 with their associated memory is recommended. Refer to Part 4 of this section for procedures.

B. Memory Utilization and Capacity

3.07 **Analyzing memory utilization** involves keeping track of used and spare memory. It also involves word usage as related to main station activity. That is, the average number of words gained or lost due to service order inputs should not exceed certain limits. These limits are a function of the office subscriber features and equipment.

3.08 The **memory capacity** determination activity uses the data obtained from the memory utilization analysis and from marketing forecasts to project the time of memory exhaust. The results of memory capacity studies will indicate if there is sufficient memory to last until the end of the engineered period of an office.

3.09 Memory utilization and available capacity should be checked monthly. Refer to Part 5 of this section for procedures.

C. Parameter Set Card Adequacy

3.10 Adequacy of parameter set card quantities is the responsibility of the traffic engineer and the network administrator. The administrator should take part in the allocation process and monitor set card changes as they occur. Particular attention should be given to traffic sensitive and line assignment sensitive set cards. Refer to Part 6 of this section for procedures.

4. ABBREVIATED CLASS CODE CONSIDERATIONS

A. Precutover Abbreviated Class Code Utilization

4.01 The 1502 and 1503 forms are used to abbreviate, in memory, lines that have common classes of service and features. Most offices will have several large groups of lines for which the originating and/or terminating class-of-service data are identical.

4.02 When manually checking abbreviation levels, some initial guidelines for eligibility should be set (for example, 25 to 50 working lines in a class). This cannot be the only criterion. Consideration must be given to the size, type (class-of-service distribution), and growth pattern (declining, growing, or potential new classes and features) of the office. Declining or soon to be eliminated classes should not be selected for abbreviation even though they are above the guideline. Some codes should be reserved for services not yet offered. A plain old telephone service (POTS) office may later become a Centrex office, or a residential office could develop a substantial amount of business service.

4.03 The Network Administrator should obtain abbreviation results from AT&T during the building of line and number translations in the Translations Data Assembler (TDA) support program. The result will be compared with the criteria defined in Paragraph 3.04. Memory shortages may require modifications of the 1502 and 1503 abbreviated class code forms for use in the TDA/(TGP) Translation Growth Process. Another support program, Translations Repack to Implement Memory Savings (TRIMS) can be used to resolve the abbreviation deficiency. The TRIMS program is discussed in detail under "Support Programs" in Section 8.

B. Annual Review of Abbreviated Class Codes

4.04 **The network administrator should initiate annual reviews of the utilization of the abbreviated class codes and arrange with Switching Control Center (SCC) to make any changes.** This activity may require making additions to the 1502A/B and 1503

forms. In each case, the next available code number is used, and the entries are made according to the instructions in the TG-1A. The use of abbreviated class codes may be reviewed on an annual basis using the AT&T Translations Area Analysis (TAA) support program process or a manual method.

4.05 All in-service abbreviated code translation changes will be made by the central office forces via recent change. While abbreviated codes can be established after the original assignments, any previously input line equipment numbers (LENs) or directory numbers (DNs) which fit the new code will remain unabbreviated unless reentered via recent change service orders. Conversely, any customers who have an abbreviated code which is intentionally or unintentionally removed will **lose service** unless the customer is reactivated with a recent change service order. Abbreviated class codes can be removed via the TRIMS support program or locally via recent change. When a code is removed locally, that action must be preceded by a review to ensure that it is not in use. This is accomplished through the use of the translations search program (XTRS).

C. Annual Verification of Memory with 1502/1503 Forms

4.06 The network administrator should annually verify, that the abbreviated code expansion table in translations matches the 1502/1503 forms. The Network Administrator should request the Switching Control Center to perform a T-Read of the expansion tables in memory and forward the results to network administration. The manually-kept 1502/1503 forms must be verified to ensure they match the T-Read memory output. If the manually-kept 1502/1503 forms and memory output do not match, the network administrator should determine which is in error and ensure that the discrepancy is corrected.

4.07 The annual review of the 1502/1503 forms may be done at the same time abbreviated class code utilization is reviewed (paragraph 4.04.) The support program used for the utilization review also produces replicas of the 1502/1503 translators as defined in ESS memory.

4.08 The TAA program may be used to perform the annual abbreviated class code and associated 1502/1503 form review. When the TAA results indicate that abbreviated utilization may cause an exhaust of memory, the TRIMS support program may also be requested. When TRIMS is required, its use should be deferred to the next annual review if possible. Additional guidelines on the use of TRIMS are provided in Paragraph 8.07. If the use of other AT&T programs in Translation Data Recovery and Reprocessing System Services (TDRRSS) are desired, they should be coupled with the annual TAA process. The need to use another program at a specific time should be considered an annual review.

D. Routine For Authorizing and Verifying Abbreviated Class Code Changes

4.09 A formal routine for authorizing and verifying abbreviate code changes is the best way to ensure that inputs are correct, that records remain current, and that the records reflect what is in memory. Individual checks should be made for specific new or changed codes right after they are input to supplement the annual review. A T-Read should be requested for the code's expansion. This check is made because if the code was input incorrectly, the classes which should have been abbreviated with the code will remain unabbreviated.

4.10 Memory activation of new abbreviated class codes required for the pending addition of new services, such as CO-Centrex, Electronic Tandem Switch (ETS), etc. should precede line and number insertion into ESS memory by at least two weeks. Also, their presence in memory should be confirmed at least one week before the insertion of lines and numbers. A "test" line and number should be inserted in recent change to confirm that abbreviation is occurring as expected. When abbreviation is confirmed, remove the "test" line and number.

4.11 For 1 ESS offices with (RSS), word consumption should be taken into consideration. Abbreviated codes should be inserted and verified as described above. Other word requirements are detailed in Section 231-090-153 Feature Documents, Operation with Remote Switching System Feature.

5. MEMORY UTILIZATION AND CAPACITY CONSIDERATIONS

A. Program Store Consumption

5.01 As an office matures and service order disconnects accumulate, holes are created in memory equal in size to the auxiliary blocks used by the disconnected lines which were not originally abbreviated. When a connect service order that requires an auxiliary block is input, the system will attempt to match its auxiliary block requirement with an existing block. If no block of the exact size exists, a memory block of the required size will be removed from a remaining large block in the range of 32 or greater. When the specific size required in the 1 to 31 range does not exist and a block size of 32 or greater does not exist, the involved service order will be rejected. This condition must be considered during the monthly analysis of spare memory space.

5.02 The quantity and size of the blocks should remain reasonably constant. If a significant change does occur, the following are possible causes:

(a) The addition of a new service or feature, such as Automatic Call Distribution (ACD) or a Remote Switching System (RSS).

(b) A large and/or complex centrex group.

(c) Trunking activity: Normal trunking changes on a day-to-day basis will not affect the consumption of translation words. There are some items, such as the activation of carrier group alarms, trunk make-busy keys, and new trunk groups that may utilize an appreciable number of words.

5.03 There is another possible cause for a sudden upward or downward change in word consumption, i.e., a "broken" link list. The link list keeps track of all the spare blocks in memory. A "broken" link list means that one or more of the spare blocks or "holes" are lost to the machine. **Central office maintenance should be notified immediately because this situation may cause serious service problems.**

NOTE: A "Broken" link list condition is indicated by the TR13 output message. Refer to Paragraph 5.09.

B. Monthly Space Check Worksheets

5.04 The monthly check of available memory space is primarily clerical in nature and involves worksheet preparation. However, the administrator is responsible for overseeing the procedure and tracking the results.

5.05 Worksheets PSV-1 through PSV-7 may be reproduced locally to assist in making the space check.

- Figure 1 - 1ESS Translation Mod and Work Calculation (Worksheet PSV-1)
- Figure 2 - 1ESS Link List Spare Right Half Words (Worksheet PSV-2)
- Figure 3 - 1ESS Link List Spare Left Half Words (Worksheet PSV-3)
- Figure 4 - 1ESS Word Usage Summary (Worksheet PSV-4)
- Figure 5 - 1ESS Word Usage Chart (Worksheet PSV-5)
- Figure 6 - 1ESS Excessive Memory Change Log (Worksheet PSV-6)
- Figure 7 - 1ESS Unlinked Memory (Worksheet PSV-7)

5.06 Five examples have been prepared. They are as follows:

- Figure 8 - Worksheet PSV-1

- Figure 9 - Worksheet PSV-2
- Figure 10 - Worksheet PSV-3
- Figure 11 - Worksheet PSV-4
- Figure 12 - Worksheet PSV-5

5.07 Each of the forms PSV-1 through PSV-7 have a space for a date and the office name.

C. Translation Modules and Words (Worksheet PSV-1) Preparation

5.08 A prompter is provided in "Data Obtained From" column. This column will contain the data source for each line or an abbreviated version of a calculation, if required. Parentheses around a letter indicates data from a line on the form. Example: (C) = Line C. Form preparation procedures are provided on a line-by-line basis. Refer to Fig. 8 for an example.

Line A - (Total Program Store Frames) Obtain from parameter set card PSF.

Line B - (Generic Program Highest Mod) Obtain highest module used (or reserved for the generic program and parameter) from parameter set card GENEND.

Line C - (Total Program Store Mods) Multiply Line A by 8. Enter result on Line C.

Line D - (Generic Program Mods Used) To obtain the number of modules used for generic and parameter data, add 1 to Line B. Enter result on Line D.

Line E - (Total Translation Mods) Subtract Line D from Line C. Enter result on Line E.

Line F - (Unlinked Translation Mods) Obtain number of unlinked modules from the Switching Control Center (SCC).

Line G - (Total Translation Words) Multiply Line E by 8192. Enter result on Line G.

Line H - (Unlinked Translation Words) Multiply Line F by 8192. Enter result on Line H.

D. Link List Spare Right Half Words (Worksheet PSV-2) and Left Half Words (Worksheet PSV-3) Preparation

5.09 The VFY-SPACE request results in a TR-13 output message. This message is required to prepare worksheets PSV-1 and PSV-2. The VFY-SPACE and resultant TR-13 output may be obtained from the ESS dial-up or the No. 2 SCCS. The review should coincide with the monthly production of line and terminal counts. Refer to Figures 13, 14, 15, and 16 for examples of left half and right half output messages.

> **NOTE: A broken link list is indicated on the TR-13 output message if at any time exactly 3 lines of data follow the TR13 line. This indicates that there is an error in the link list and space has been lost. The Switching Control Center (SCC) should be notified immediately. Refer to Par. 5.03.**

5.10 The TR-13 output messages should be entered on Worksheet PSV-2 for right half words and Worksheet PSV-3 for left half words. See Figures 9 and 10 for prepared examples of these worksheets. Worksheet preparation procedures and related calculations are contained in the following paragraphs:

Column A - (BLOCK SIZE) Identifies the Block Sizes 1 through 31 on Lines 1 through 31 for right half words and block sizes 2 through 30 on even numbered Lines 2 through 30 for left half words.

Column B - (Octal Number of Blocks) Determine the number of spare linked words available in the right half words by inputting the following message: VFY-SPACE-290330. To determine the number of spare linked-words available in the left half words, input the following message: VFY-SPACE-291330. The system will respond with a TR13 output message for each block size. Each output message will define the total number of available blocks for each size. The number of blocks printed is in octal. Enter this number on the appropriate line in Column B. Refer to Figures 13 and 15.

Column C - (Decimal Number of Blocks) Convert the octal number in Column B to a decimal. Refer to the 1ESS Input Message Manual 1A001, Volume 1, Input Usage Message Guidelines Tab, Octal-Decimal Conversion Tables. Numbers larger than the table size may be converted by a program in the NO. 2 SCC. Enter decimal number of blocks in Column C.

Column D - (Number of Decimal Words) Multiply Column A by Column C and enter result in Column D. After completing line entries, total Column D and enter the result on Column D total line.

Column E - (Octal Block Size 32 or Greater) The TR-13 message for block size 32 or greater will contain the octal size of the block. Enter this data in Column E. Refer to Figures 14 and 16. Messages VFY-SPACE-290321 (right half) and 291321 (left half) are used to obtain block size 32 or greater TR13 output messages.

Column F - (Decimal Block Size 32 or Greater) Convert the octal number in Column E to a decimal number. Use the octal to decimal references given for Column C. Enter this decimal result in Column F. After completing line entries, total Column F and enter result on Column F total line.

Column G - (Total right half or left half Spare Linked Words) Add Column D total to Column F total. Enter the result on Column G total line.

E. Word Usage Summary (Worksheet PSV-4) Preparation

5.11 The following documents are required for the preparation of Worksheet PSV-4:

- Traffic Order
- Monthly Main Station Count
- Forms PSV-1, PSV-2 and PSV-3

5.12 A prompter is provided in "Data Obtained From" column. This column will contain the data source for each line or an abbreviated version of a calculation, if required. Parentheses around a letter indicates data from a line on the form. Example: (C) = Line C. Form preparation procedures are provided on a line-by-line basis. Refer to Fig. 11 for a word usage summary worksheet example.

Line A - (Total Main Station in Use) Obtain Line A data from official main station count for that month.

Line B - (Total Main Station Change Per Month) Subtract preceding month Line A from present month Line A. Enter result on Line B.

Line C - (Right Half Words Available) Obtain Line C data from Line G on Worksheet PSV-1.

Line D - (Right Half Words Spare) Add line H data on worksheet PSV-1 to Column G data on Worksheet PSV-2. Enter result on Line D.

Line D1 - (Right Half Unlinked Words) Obtain Line D1 data from Line B on Worksheet PSV-7. NOTE: If the XLCK has not been run within the last month, use the existing XLCK data to approximate the words that may be lost.

Line E - (Right Half Words in Use) Subtract Lines D and D1 from Line C. Enter result on Line E.

Line F - (Right Half Word Change Per Month) Subtract preceding month Line E from present month Line E. Enter result on Line F.

Line G - (Left Half Words Available) Obtain Line G data from Line G on Worksheet PSV-1.

Line H - (Left Half Words Spare) Add Line H data on Worksheet PSV-1 to Column G data on Worksheet PSV-3. Enter result on line H.

Line H1 - (Left Half Unlinked Words) Obtain Line H1 data from Line A on Worksheet PSV-7. See Note on Line D1.

Line J - (Left Half Words in Use) Subtract Lines H and H1 from Line G. Enter result on Line J.

Line K - (Left Half Words Change Per Month) Subtract preceding month Line J from present month Line J. Enter result on Line K.

Line L - (Total Words Available) Add one half of Line G to Line C. Enter result on Line L.

Line M - (Total Words in Use) Add one half of Line J to Line E. Enter result on Line M.

Line N - (Total Words Change Per Month) Add one half of Line K to Line F. Enter result on Line N.

Line P - (Total Words Per Main Station Based on Words and Main Stations in Use) Divide Line M by Line A. Enter result on Line P.

Line Q - (Total Words Per Main Station Based on Change Per Month) Divide Line N by Line B. Enter result on Line Q.

Line R - (Engineered Provision of Main Station Capacity) Obtain Line R data from the current Traffic Order.

Line S - (Main Station Capacity Based on Engineered Main Station Provision) Subtract Line A from Line R. Enter result on Line S.

Line T - (Main Station Capacity Based on the Total Spare Words Available) Subtract Line M from Line L and then divide this figure by Line P. Enter result on Line T.

Line U - (Months to Main Station Exhaust) Compare Line T with Line S and determine the smaller figure. Divide this figure by Line B or the office main station growth per month figure. Enter result on Line U.

Line V - (Percent Right Half Words Used) Divide Line E by Line C and multiply this figure by 100. Enter result on Line V.

Line W - (Percent Left Half Words Used) Divide Line J by Line G and multiply this figure by 100. Enter result on Line W.

Line X - (Percent Total Words Used) Divide Line M by Line L and multiply this figure by 100. Enter result on Line X.

F. Word Usage Chart (Worksheet PSV-5) Preparation

5.13 Form PSV-5 (Word Usage Chart) is optional. It is used to track the percent of words used on a monthly basis.

5.14 The chart is divided into three word usage columns named Right Half, Left Half and Total. Data entered in these columns are taken directly from Form PSV-4, Lines V, W and X. Refer to Figure 12 for an example.

5.15 Draw a solid line to represent the maximum upper limit. Draw a dotted line to represent a warning limit. Traffic engineering should be notified when word usage enters this band. This is necessary because normal equipment additions require a minimum one year period. The lines are prepared as follows:

- Enter 90 percent (or locally derived percent based on local usage characteristics) on the graph as a bold horizontal line.
- Enter 80 percent (or locally-derived percent based on local usage characteristics) on the graph as a horizontal dotted line.

G. Excessive Memory Change (Worksheet PSV-6) Preparation

5.16 Worksheet PSV-6 (See Figure 6) is used to explain excessive memory use. The term "excessive" does not necessarily mean that memory has been wasted but simply that a block (or blocks) has disappeared for which an accounting must be made.

5.17 If any unexplained excessive memory use arises, enter the condition and the date on the PSV-6 Worksheet. Contact network maintenance to determine the cause of the problems. When the problem is resolved, record the cause and the corrective action taken.

H. Unlinked Memory (Worksheet PSV-7) Preparation

5.18 The XLCK output is required for Worksheet PSV-7 (See Figure 7) preparation. This output is obtained from the Switching Control Center (SCC) and is used to track and/or analyze lost

memory. Refer to Figure 17 for a XLCK printout example.

5.19 The use of XLCK to identify unlinked memory should coincide with the monthly production of line and terminal counts and the monthly identification of linked memory.

5.20 The XLCK program, when given upper and lower address boundaries will find and identify all lost memory (unlinked), including complete stores. This identification will include the octal block size and the starting address of the block.

5.21 The XLCK output must be reviewed to determine if large blocks of lost memory or holes are present in the translation area. If these large blocks are present, the SCC forces have the capability of returning them to the link list. By using XLCK to aid in recovering lost memory, the translations area remains relatively consolidated.

I. Memory Utilization and Capacity Analysis

5.22 Word usage summary Worksheet PSV-4 (Fig. 11) is used for memory utilization and capacity analysis. Analyze Form PSV-4 as follows:

Line Q - Is an indicator of memory usage efficiency. A high jump in words/main station should be investigated. Abnormal uses of memory should be recorded on the PSV-6 log.

Line U - Gives an estimate of months until main station exhaust based on the lessor of engineered main station capacity or total words available.

Lines S and T - The smaller figure represents the number of main stations that may be assigned before exhaust occurs.

Lines V, W and X - Represent the percent use of Right Half, Left Half and total words. When Line V (Right Half), Line W (Left Half), or Line X (Total) reaches the 80-90 percent level, notify engineering. Lines V, W and X may be plotted on the Word Usage Chart, Form PSV-5 to assist in tracking the percent words used on a monthly basis. Refer to Figure 12 for an example.

(1) Analysis of change in words versus change in main stations.

5.23 The basic method for tracking memory utilization is a "change in words to change in main station" calculation. The words per main station is that number of translation words used or returned for each main station gained or lost, respectively. Refer to Line Q on Worksheet PSV-4.

5.24 It is difficult to establish guidelines for a reasonable "Change in words to change in main stations" that will fit all ESS offices. This is normally due to activity in translators that are not directly controlled by the amount of active lines and numbers. Given no activity in these types of translators, the activation of abbreviated main stations (both line and numbers) could result in zero word usage. This is based on the fact that a Primary Translation Word (PTW) must be permanently associated with each installed line and each installed number. Whether lines and numbers are working or not, these words never appear to be spare. With this design, the activation of an abbreviated main station simply results in changing the contents of the line and number PTW's to the following:

- Line PTW = abbreviated code and directory number
- Directory Number PTW = abbreviated code and line equipment number

5.25 The words used per main station figure can serve as an indicator of abbreviation efficiency. Actual results obtained from one office for prolonged periods indicated 4-8 words per main station for simple services and 9-16 words per main station for complex services.

5.26 As actual percent abbreviations are determined for each office, a more precise range can be identified and used for the ongoing monitoring process. This computation can be expected to increase as non-line and number translators have activity. This computation can be expected to decrease with minimal non-line and number translation activity and effective

abbreviation.

5.27 Results falling outside the defined ranges could indicate lost memory, poor abbreviation, or problems in the VFY-SPACE printout. If this occurs, analysis and resolution should be initiated.

(2) Analysis of Word Usage

5.28 A stable level of word usage linked with an equal or greater change in the station result should be indicative of good abbreviation. The Network Administrator should anticipate, based on translation activity, noticeable changes in the word usage measurements. When exceptional word usage changes are not anticipated, a review of previous vs. current month spare memory needs to be initiated by the Network Administrator (i.e., a 500 word block of spare memory in last month's report does not exist in this month's report). Consultation with maintenance should disclose the use of the excess memory. If not, the link list may have been broken. (Refer to Par. 5.10). Record excessive word usage on Form PSV-6.

(3) Analysis of Lost Space

5.29 The TAA output contains a listing by block location and size of the available link list space. This is also a listing of the lost space in the office. Totals are provided for both. These totals can be used to evaluate the accuracy of the manual translations space review procedures.

J. METHODS OF OBTAINING UNUSED MEMORY

5.30 Unused (spare) memory should be added to the link list as required. Maintenance personnel should advise the administrator as each block of memory is added to the link list.

5.31 Spare memory should not be added to the link list until one of the following conditions occur:

- Spare linked words in block sizes of 32 or greater are nearing exhaust.
- A block of memory larger than any presently available is required for translation input.

K. DISPOSITION OF MEMORY WORKSHEETS

5.32 Each month completed copies of Worksheets PSV-4 and PSV-6 are to be forwarded to the traffic engineer responsible for the particular unit and any other group so designated by your company.

5.33 The administrator will maintain an official office copy of Worksheets PSV-4, PSV-5, and PSV-6.

6. PARAMETER SET CARD CONSIDERATIONS

A. GENERAL DESCRIPTION

6.01 Parameters are produced by AT&T with a Parameter Data Assembler (PDA) computer program. Input data necessary to perform this function are provided by the telephone company.

6.02 Information contained in parameters is made up of four fundamental categories. They are:

(a) Equipment Items: Quality of frames and units, line and trunk network structures, type of automatic message accounting (AMA), etc.

(b) Software Items: Software items are defined and controlled by parameters. Examples of software items are as follows:

- Call Registers
- Hoppers
- Queues
- Peripheral Order Buffers
- Path Memory

(c) Certain Master Scan and Central Pulse Distributor Assignments: although all assignment information is contained in translations, certain assignment data are more readily usable by some programs in the parameter area.

(d) Office Options: Items the telephone company determines for each office. Some options specified are:

- Partial-dial call handling

- Dial tone first
- Coin collect - coin return

6.03 In addition to building parameter data which are not reflected in CS, the PDA program specifies CS table sizes and locations as determined by the traffic engineer, network administrator, equipment engineer, Central Office Equipment Engineering, System-Mechanized Ordering (COEES-MO) outputs and AT&T generated assignments. Each specific table is determined by one or more set cards or AT&T generated input to the PDA process.

6.04 When adding equipment items (hardware) to a 1 ESS entity during growth, parameter and translation (software) information for the hardware must be changed. It is imperative that parameter data and translation data match. This matching is extremely critical with regard to the size of head tables in the translation area of memory. Head table sizes are defined on the ESS-1500 series forms. Head table sizes must be equal to, or greater than, associated parameter values. The ESS-1500 series forms are continuing to be changed or modified. Therefore, the network administrator should consult the Translation Guide No. 1A (TG-1A), Division 3, Section 5A to 5E, to ensure that the information at their disposal is the most current.

6.05 The PDA listing of assignments is available to the telephone company from the AT&T engineer and should be requested. The traffic engineer must compare the work sheet entries to the PDA listing to ensure adequate CS words are provided in total and by component. Any differences should be reconciled. CS words assigned by the PDA can differ slightly from amounts shown on the worksheets, as a result of the manner in which the AT&T engineer assigns certain hardware items. These differences should not significantly affect the CS requirements. It means, however, that only the listing of PDA assignments will include word requirements which are accurate in every detail for a particular office.

6.06 The network administrator is responsible for retaining a copy of the current PDA listing. The network administrator should request a copy of all new PDA runs from the equipment engineer.

B. PRECUTOVER ADMINISTRATION RESPONSIBILITIES

6.07 A general responsibility of a network administrator is to provide accurate and complete data to the traffic engineer. Through the use of this data, the engineer can accurately size and time a new job.

6.08 Traffic sensitive set cards are those requiring a Poisson function in the calculation of their values. Line assignment related set cards are those required to provide sufficient translation areas for line assignment activities. Their established values should reflect the concurrence of both the traffic engineer and the network administrator. This can be accomplished at a formal or informal conference. Refer to practice 231-070-430 for a list of traffic sensitive call store items. Refer to Fig. 18 for examples of line assignment related set card values.

6.09 The first 20 pages of the PDA contain all the set card values for the office being cut over. All the line assignment related and traffic sensitive related set card values should be checked against the values agreed upon with the traffic engineer. Refer to Parameter Guide (PG-1) for Set Card Details.

6.10 Should there be need for other PDA runs prior to the cutover of the machine, the new set card values for each PDA run should be checked. It should be noted that on each PDA run subsequent to the first, every set card that has been changed will show both the old and the new values.

> NOTE: There may be an occasion when a local overwrite has been performed to eliminate an error or a shortage in CS. It is imperative that traffic engineering be notified and that they notify AT&T. When the next PDA run is loaded, the item that was overwritten should be checked immediately.

This will eliminate any possibility of the original shortage or error recurring.

C. POSTCUTOVER ADMINISTRATION RESPONSIBILITIES

6.11 All of the areas of responsibility listed in the precutover area remain in a post-cutover environment. Additional responsibilities are listed in the following paragraphs.

6.12 Tracing set card changes as they occur with each parameter run is of prime importance. The network administrator is responsible for obtaining and maintaining a copy of the latest parameter run for each office. To ensure the network administrator is aware of any new parameter run, communications should be maintained between the network administrator, the SCC personnel, and the traffic engineer.

6.13 Another method for obtaining information regarding the current parameter issue number and the issue of generic program installed is to interrogate the machine itself. The issue of generic can be obtained by typing in the message WHO-RU. The ID01 output message will contain the version and issue of the installed generic program.

6.14 When an addition or rearrangement is being considered, the network administrator must have an integral part in the planning process. The existing head table (1500 series forms) values should be checked against those contemplated for the new job. The values shown on the head table cannot be exceeded.

6.15 To determine the degree of utilization of translation related CS items, such as multiline groups or Centrex groups, the network administrator must have a method of tracking set card values.

6.16 One such method of tracking involves both loading and line assignment functions performed by the network administration organization. Upon receiving a copy of the latest parameter run, the network administrator will review the new set card values. Should there be a question on any changed set cards, the administrator must contact the traffic engineer and resolve the problem before the new parameters are loaded into the ESS machine. Special attention should be given to any local overwrites that may have been performed.

6.17 Special note should be taken to the values of the set cards listed in Fig. 18. This table is not all inclusive but provides information on the more common line assignment related set cards. Any changed items should be brought to the attention of the line assignment personnel. Should there be any question on any of these items, the TG-1A, Division 3, Section 5, should be consulted for the most current information.

6.18 Line assignment personnel will then enter the set card values on the ESS translation forms identified in Fig. 18. The parameter issue number and the data should also be entered. The placing of this information will be determined locally. In most cases, the top of the first page of a given form would be the most appropriate place.

6.19 If the ESS is a new office being cut over, the personnel responsible for the cutover will be responsible for entering the information on the translations form.

6.20 By following the procedure, line assignment personnel can track the utilization of the parameter items detailed in this section. When given item, i.e., Centrex (CTG), multiline hunt group (MHG), etc, reaches 75 percent utilization, line assignment will notify the administrator in charge of loading. Both line assignment and loading personnel should discuss the forecast for future growth of the item. The network administrator in charge of loading will then consult with the traffic engineer to increase or reallocate the memory required for the parameter item(s) in question.

7. TRANSLATIONS SEARCH PROCEDURE (XTRS)

7.01 One method of checking abbreviated codes is through the use of the translations search procedure (XTRS). This procedure must be run by the switching control center. The following paragraphs provide an overview of XTRS. If more detailed information is required, consult Section

231-151-304.

7.02 The XTRS is a general purpose program for searching translators. Its basic function allows a user to select an octal number and search certain translators for matching bits. When a match is found, the program will print the associated translation information or optional information, if selected. The program allows the user to select specific translators, types of matches, and printing programs as needed.

7.03 As specified in Paragraph 4.05, XTRS must be used to confirm that abbreviated class codes are not in use before they are removed locally.

7.04 The XTRS program searches through the structure of translations to locate a particular data item in translations.

7.05 After the completion of XTRS, the network administrator should analyze the results and add abbreviated codes as required. It should be noted that additions to abbreviated codes will not affect the lines already in translations (that are not abbreviated). Therefore, it may be necessary to run one or more of the AT&T support programs to accomplish abbreviation of these lines.

8. SUPPORT PROGRAMS

8.01 There are situations that require a deeper analysis of memory than the network administrator is able to perform with the tools at his/her immediate disposal. Under circumstances such as these, the administrator should discuss, with the traffic engineer, the use of one of the AT&T provided support programs. These programs have been developed to aid the operation company in retrieving, analyzing, correcting, reconstructing, and repacking translations data from the memory of an office. The programs are part of the Translation Data Recovery and Reprocessing System Services (TDRRSS). They are furnished as separate processes from which one or more can be selected to achieve the results desired by the operating company.

8.02 The basic set of TDRRSS programs are as follows:

- Translation Area Analysis (TAA)
- Translation Repack to Implement Memory Savings (TRIMS)
- Translation Retrofit and Repack (TRR)

8.03 A supplementary set of TDRRSS programs are as follows:

- Mechanized ESS Feature Recovery (MEFR)
- Translation Assignment Regeneration (TAR)
- Conversion of 1ESS to 1A ESS (1ACONV)
- Translation Data Disassembler (TDD)

8.04 A brief description of the various programs are contained in the following paragraphs.

A. Translation Area Analysis (TAA)

8.05 The TAA program is used for research or diagnosis of translations area problems. It is also the preliminary processing program for the Translation Repack to Implement Memory Savings (TRIMS) or Translation Retrofit Repack (TRR) run.

8.06 The TAA is useful in determining the abbreviation efficiency of the office. A summary listing of all abbreviated codes (POTS and Centrex) used by the office, the number of lines using each code in the listing, the total abbreviated, the total unabbreviated which could be abbreviated, and the total unabbreviated which cannot be abbreviated are all included in the TAA output. Replicas of the recovered 1500A, 1502A, 1502B, and 1503 forms are also printed.

B. Translation Repack to Implement Memory Savings (TRIMS)

8.07 The TRIMS program replaces the manual TAA analysis effort for determining which classes of service can be abbreviated. The program can also be used to eliminate the manual effort required to build new abbreviated codes for frequently occurring unabbreviated classes. The program has the options necessary to:

(a) Abbreviate all classes that can be abbreviated

(b) Abbreviate classes in a hierarchial pattern, reserving some abbreviated codes for future use

(c) Unabbreviate little-used classes as specified by the requestor

(d) Re-engineer head table sizes to more accurately reflect office requirements.

8.08 When TRIMS is used, Network Design, Network Switching Administration, and Translation Administration should jointly complete the E-8086 Questionnaire. This is intended to ensure the desired abbreviated efficiency is obtained.

8.09 TRIMS can be requested to reserve a quantity of abbreviated codes for future use. Reserving of codes should be done with care. TRIMS cannot recover significant quantities of translations space unless there are unused abbreviated codes available. TRIMS also allows a USER limit to be specified. TRIMS will not build a new abbreviation code unless sufficient users are available to justify the new code. TRIMS will not automatically remove codes which have less than the specified quantity of users.

8.10 Upon completion of full TRIMS processing, the translations data are repacked. The new translations produced by the system can be loaded into the machine. Computer printouts of the new translation information should be retained by central office maintenance, the network administrator, and engineering.

8.11 The TRIMS printout will contain the following:

(a) The quantities of LENs and DNs assigned against each abbreviated code, reflecting the quantity of words that have been saved, the percentage of abbreviation efficiency, and the overall office abbreviation percentage in this TRIMS run.

(b) The 1502A, B and 1500 series forms that must be used by the network administrator to update the administrative office records. The 1502A, B and 1503 forms data produced should be reviewed to determine that only tariffed features or feature combinations are present in the codes. Care should be taken to determine that code combinations are not duplicated.

(c) MLH analysis which displays terminal numbers of the multiline hunting group which are located in the same concentrator.

(d) The multi-line hunt analysis produced by the TRIMS program should be requested and sent to the Line and Number Administrator for review and corrective action.

8.12 The TAA gives a functional listing of the original translations data before repack, along with its diagnostic information. The TRR and TRIMS produce a functional listing of the translations data after repack.

C. Translation Retrofit Repack (TRR)

8.13 The TRR is a process by which existing translations are repacked into the smallest possible area, thus eliminating the holes referred to in previous paragraphs. Almost all spare words are contained in the 32-or-greater hole category after the run is finished.

8.14 The TRR also includes the error analysis contained in the TAA; it involves the remagnetizing of PS cards which must then be shipped back to the 1 ESS switch. It does not, however, change the abbreviation status of the office. When retrofitting a new generic program in which module requirements exceed the existing program, a TRR can be used to relocate translation data in order to vacate modules needed by the retrofit generic program.

8.15 If an office is to be repacked, it is recommended that serious consideration be given to using TRIMS for the repack. The incremental cost of TRIMS when run with a TRR is very low. If the abbreviation efficiency is low (90 percent or less), a TRIMS with repack should be run instead. A TRIMS run is optional if the office abbreviation

efficiency is between 90 and 95 percent and is not necessary if the office abbreviation efficiency is 95 percent or greater. The percent abbreviation may be identified by obtaining a TAA run before the TRIMS run. Should a TRIMS run be necessary, it should be understood that an additional TAA run is **not** necessary.

NOTE: Normally this takes two dumps and two AT&T runs which is time consuming. But, it is worth it if the switch memory is nearly exhausted.

8.16 The TRR and TRIMS runs require that no card writing be done during the processing interval. The new mods obtained from these runs will replace all active translation mods in PS and will reflect only the translation structure at the time that the translation area was copied. Hence, any card writing of recent changes made since the area was copied would be lost. Close coordination is important to preclude the possibility of filling the recent change area of call store before incorporation of the new memory cards from these runs.

8.17 For more detailed information on the support program process, refer to AT&T Publication PA-591092 - User's Manual for Translation Data Recovery and Reprocessing System.

D. Mechanized ESS Feature Recovery (MEFR)

8.18 The MEFR Program produces line and number translations as obtained from ESS memory. It can be used to:

- validate and purify office records
- load other systems such as COSMOS or LMOS.

E. Translation Assignment Regeneration (TAR)

8.19 The TAR program produces trunking records (ESS 1200 Series) and traffic register records (ESS 1400 series) as obtained from ESS memory. The TAR requests should be coordinated with the Network Administrator and Traffic Engineer to ensure support program coupling is achieved.

F. Conversion of 1ESS to 1AESS (1ACONV)

8.20 The 1ACONV program is used to convert a 1ESS to 1AESS. During the conversion process is an excellent time to rectify poor abbreviation with the TRIMS program. The improved abbreviation is applied only to the 1AESS. Paragraph 8.16 discusses recent change freezes in more detail.

G. Translations Data Disassembler (TDD)

8.21 The TDD program produces routing and charging records (1300 series) and line and centrex records (1100 series) as obtained from ESS memory. The output provides an excellent tool to verify office records without extensive verify messages and associated clerical time. TDD may be coupled with every second TAA review (effectively every 2 years). A TDD may be requested with the next TAA if one has never been in an office.

PSV-1 1 ESS TRANSLATION MODULES AND WORDS

( ) = Use Data From Line (A) Thru Line (H) Office _____

Item	Data Obtained From		Dates			
Mod Calculation						
Total Program Store Frames	Set Card: PSF	A				
Generic Program Highest Mod	Set Card: GENEND	B				
Total Program Store Mods	(A) × 8	C				
Generic Program Mods Used	(B) + 1	D				
Total Translation Mods	(C) – (D)	E				
Unlinked Trans. Mods	S.C.C.	F				
Word (37 Bit) Calculation						
Total Translation Words	(E) × 8192	G				
Unlinked Translation Words	(F) × 8192	H				

Figure 1 - 1 ESS Translation Modules and Words (Worksheet PSV-1) (5.05)

PSV-2 1 ESS LINK LIST SPARE RIGHT HALF WORDS

Date _____ **Office** _____

Block Size	Octal No. Of Blocks	Decimal No. Of Blocks	No. Of Words (Col. A) × (Col. C)	Block Size 32 Or Greater		R.H. Words Spare
				Octal	Decimal	(Col. D) Total + (Col. F) Total
A	B	C	D	E	F	G
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						

Totals _____ + _____ = _____

Note: Columns (B) And (E) Data Are Obtained From Worksheet VFY-Space 29

Figure 2 - 1 ESS Link List Spare Right Half Words (Worksheet PSV-2) (5.05)

PSV-3 1 ESS LINK LIST SPARE LEFT HALF WORDS

Date ______________ Office ______________

Block Size	Octal No. Of Blocks	Decimal No. Of Blocks	No. Of Words (Col. A) × (Col. C)
A	B	C	D
2			
4			
6			
8			
10			
12			
14			
16			
18			
20			
22			
24			
26			
28			
30			

Block Size 32 Or Greater	
Octal	Decimal
E	F

L.H. Words Spare
(Col. D) Total + (Col. F) Total
G

Totals ______________ + ______________ = ______________

Note: Columns (B) And (E) Data Are Obtained From Worksheet VFY-Space 29

Figure 3 - 1 ESS Link List Spare Left Half Words (Worksheet PSV-3) (5.05)

( ) = Use Data From Line (A) Thru Line (X) Office _____

Item	Data Obtained From		Dates			
Total Main Stations:						
In Use	M.S. Monthly Count	A				
Change Per Month	(A) — Proc. Mo. (A)	B				
Right Half Words (23 Bits):						
Available	PSV-1, Line G	C				
Spare	(PSV-1, Line H) + (PSV-2, Col. G)	D				
unlinked	PSV-7, Line B	DI				
In Use	(C) — (D) — (DI)	E				
Change Per Month	(E) - Prec. Mo. (E)	F				
Left Half Words (11 Bits):						
Available	PSV-1, Line G	G				
Spare	(PSV-1, Line H) + (PSV-3, Col. G)	H				
Unlinked	PSV-7, Line A	HI				
In Use	(G) — (H) — (HI)	J				
Change Per Month	(J) - Prec. Mo. (J)	K				
Total Words (23 Bit Equivalent):						
Available	[G ÷ 2] + (C)	L				
In Use	[J ÷ 2] + (E)	M				
Change Per Month	[K ÷ 2] + (F)	N				
Total Words Per Main Station Based On:						
In Use	(M) ÷ (A)	P				
Change Per Month	(N) ÷ (B)	Q				
Main Station Capacity:						
Engineered	N.D.O.	R				
Based On Engineered M.S. Available	(R) — (A)	S				
Based On Total Spare Words	[(L) — (M)] ÷ (P)	T				
Months To Exhaust	[Lessor Of (T) Or (S)] ÷ [(B) Or M.S. Growth/Mo.]	U				
% Translation Words Used:						
Right Half	(E) ÷ (C) × 100	V				
Left Half	(J) ÷ (G) × 100	W				
Total	(M) ÷ (L) × 100	X				

Figure 4 - 1 ESS Word Usage Summary (Worksheet PSV-4) (5.05)

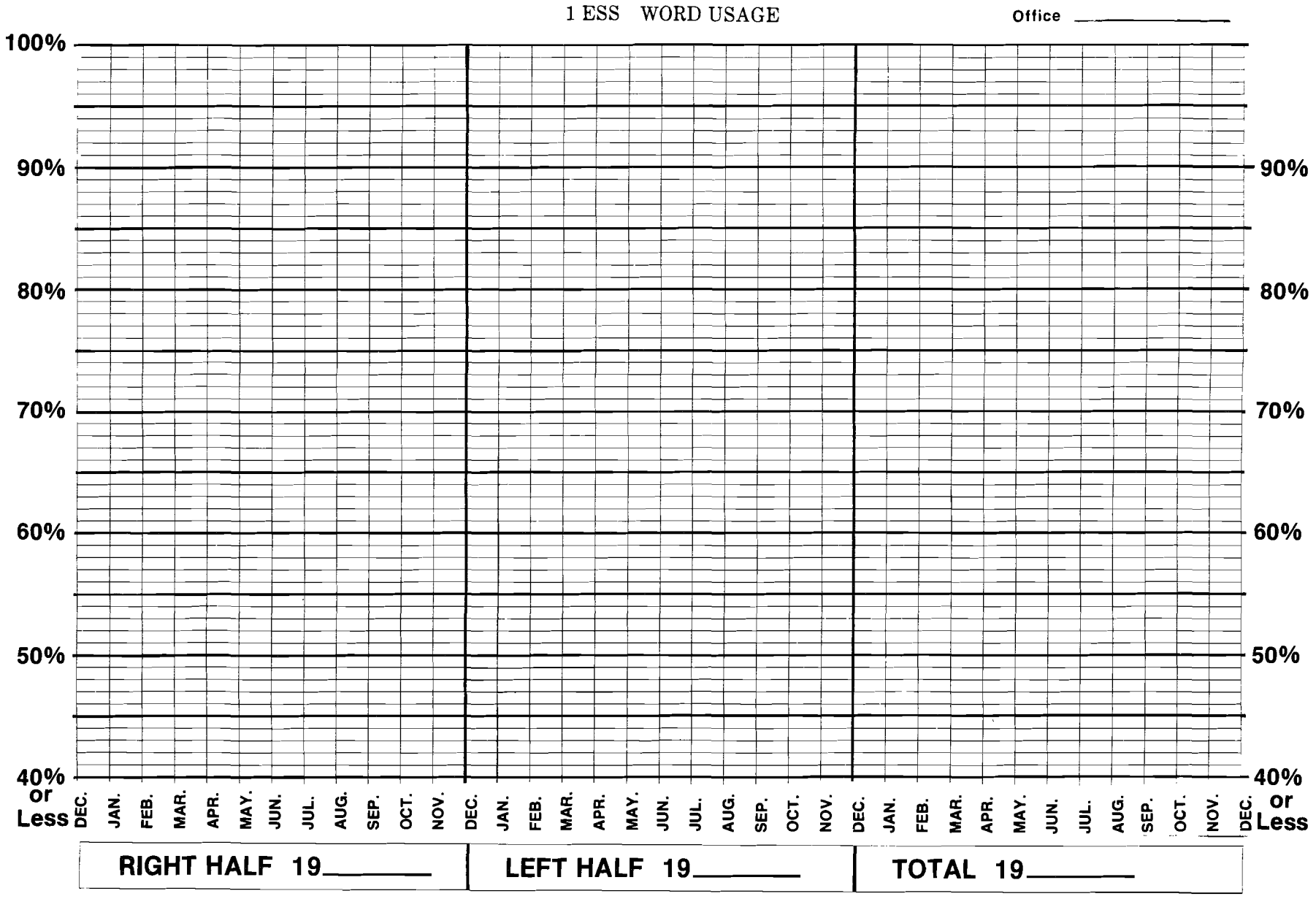


Figure 5 - 1 ESS Word Usage Chart (Worksheet PSV-5) (5.05)

PSV-6 1 ESS EXCESSIVE MEMORY CHANGE Office _____

Note No.	Date	Condition	Cause Or Corrective Action	Is Problem Corrected

Figure 6 - 1 ESS Excessive Memory Change (Worksheet PSV-6) (5.05, 5.16)

PSV-7 1 ESS UNLINKED MEMORY

NETWORK ADMINISTRATOR DATE

LISTED BELOW ARE THE STARTING ADDRESSES AND BLOCK SIZES FOR ALL UNLINKED PS MEMORY SIZE 32 OR GREATER. IN UNIT _____, BUILDING _____. THE AUXILIARY PROGRAM XLCK PROVIDING THIS INFORMATION WAS RUN ON _____ 19 __.

CENTRAL OFFICE FOREMAN

LEFT HALF			RIGHT HALF		
STARTING ADDRESS	OCTAL SIZE OF BLOCK	DECIMAL	STARTING ADDRESS	OCTAL SIZE OF BLOCK	DECIMAL
TOTAL (IN DECIMAL)		_____ (A)	TOTAL (IN DECIMAL)		_____ (B)

Figure 7 - 1 ESS Unlinked Memory (Worksheet PSV-7) (5.05, 5.18)

PSV-1 1 ESS TRANSLATION MODULES AND WORDS

( ) = Use Data From Line (A) Thru Line (H) Office _____

Item	Data Obtained From		Dates			
			1-86	2-86		
Mod Calculation						
Total Program Store Frames	Set Card: PSF	A	8	→		
Generic Program Highest Mod	Set Card: GENEND	B	40	→		
Total Program Store Mods	(A) × 8	C	64	→		
Generic Program Mods Used	(B) + 1	D	41	→		
Total Translation Mods	(C) – (D)	E	23	→		
Unlinked Trans. Mods	S.C.C.	F	6	→		
Word (37 Bit) Calculation						
Total Translation Words	(E) × 8192	G	188416	→		
Unlinked Translation Words	(F) × 8192	H	49152	→		

Figure 8 - 1 ESS Translation Modules and Words (Worksheet PSV-1) Example (5.06, 5.08)

PSV-2 1 ESS LINK LIST SPARE RIGHT HALF WORDS

Date 2-1-86 Office _____

Block Size	Octal No. Of Blocks	Decimal No. Of Blocks	No. Of Words (Col. A) × (Col. C)	Block Size 32 Or Greater Octal	Block Size 32 Or Greater Decimal	R.H. Words Spare (Col. D) Total + (Col. F) Total
A	B	C	D	E	F	G
1	1	1	1	1343	739	
2	20	16	32	17675	8125	
3				75	61	
4				75	61	
5				17674	8124	
6				20000	8192	
7						
8						
9						
10						
11	2	2	22			
12	2	2	24			
13						
14						
15	22	18	270			
16						
17						
18	1	1	18			
19	4	4	76			
20	1	1	20			
21						
22						
23	1	1	23			
24						
25	30	24	600			
26						
27	2	2	54			
28	5	5	140			
29	5	5	145			
30	3	3	90			
31						

Totals 1536 + 25302 = 26838

Note: Columns (B) And (E) Data Are Obtained From Worksheet VFY-Space 29

Figure 9 - 1 ESS Link List Spare Right Half Words (Worksheet PSV-2) Example (5.06, 5.10)

PSV-3 1 ESS LINK LIST SPARE LEFT HALF WORDS

Date 2-1-86 Office

Block Size	Octal No. Of Blocks	Decimal No. Of Blocks	No. Of Words (Col. A) × (Col. C)
A	B	C	D
2			
4			
6			
8	6	6	48
10			
12			
14			
16			
18			
20	1	1	20
22			
24			
26			
28	20	16	448
30	1	1	30

Block Size 32 Or Greater	
Octal	Decimal
E	F
2212	1162
70	60
70	60
17674	8124
20000	8192
20000	8192
17674	8124
70	60
70	60
17674	8124
20000	8192

L.H. Words Spare
(Col. D) Total + (Col. F) Total
G

Totals 546 + 50350 = 50896

Note: Columns (B) And (E) Data Are Obtained From Worksheet VFY-Space 29

Figure 10 - 1 ESS Link List Spare Left Half Words (Worksheet PSV-3) Example (5.06, 5.10)

PSV-4 1 ESS TRANSLATION WORD USAGE SUMMARY

( ) = Use Data From Line (A) Thru Line (X) Office _____

Item	Data Obtained From		Dates			
			1/86	2/86		
Total Main Stations:						
In Use	M.S. Monthly Count	A	17323	18093		
Change Per Month	(A) — Proc. Mo. (A)	B	0	770		
Right Half Words (23 Bits):						
Available	PSV-1, Line G	C	188416	188416		
Spare	(PSV-1, Line H) + (PSV-2, Col. G)	D	77060	75990		
Unlinked	PSV-7, Line B	D1	620	818		
In Use	(C) — (D) — (D1)	E	110736	111608		
Change Per Month	(E) - Prec. Mo. (E)	F	0	872		
Left Half Words (11 Bits):						
Available	PSV-1, Line G	G	188416	188416		
Spare	(PSV-1, Line H) + (PSV-3, Col. G)	H	101010	100048		
Unlinked	PSV-7, Line A	H1	1057	1363		
In Use	(G) — (H) — (H1)	J	86349	87005		
Change Per Month	(J) - Prec. Mo. (J)	K	0	656		
Total Words (23 Bit Equivalent):						
Available	[G ÷ 2] + (C)	L	282624	282624		
In Use	[J ÷ 2] + (E)	M	153910	155110		
Change Per Month	[K ÷ 2] + (F)	N	0	1200		
Total Words Per Main Station Based On:						
In Use	(M) ÷ (A)	P	8.88	8.57		
Change Per Month	(N) ÷ (B)	Q	0	1.56		
Main Station Capacity:						
Engineered	N.D.O.	R	29200	29200		
Based On Engineered M.S. Available	(R) — (A)	S	11877	11107		
Based On Total Spare Words	[(L) — (M)] ÷ (P)	T	14494	14879		
Months To Exhaust	[Lessor Of (T) Or (S)] ÷ [(B) Or M.S. Growth/Mo.]	U	15 MO.	14 MO.		
% Translation Words Used:						
Right Half	(E) ÷ (C) × 100	V	58.77	59.23		
Left Half	(J) ÷ (G) × 100	W	45.82	46.17		
Total	(M) ÷ (L) × 100	X	54.45	54.88		

Figure 11 - 1 ESS Word Usage Summary (Worksheet PSV-4) Example (5.06, 5.12, 5.22)

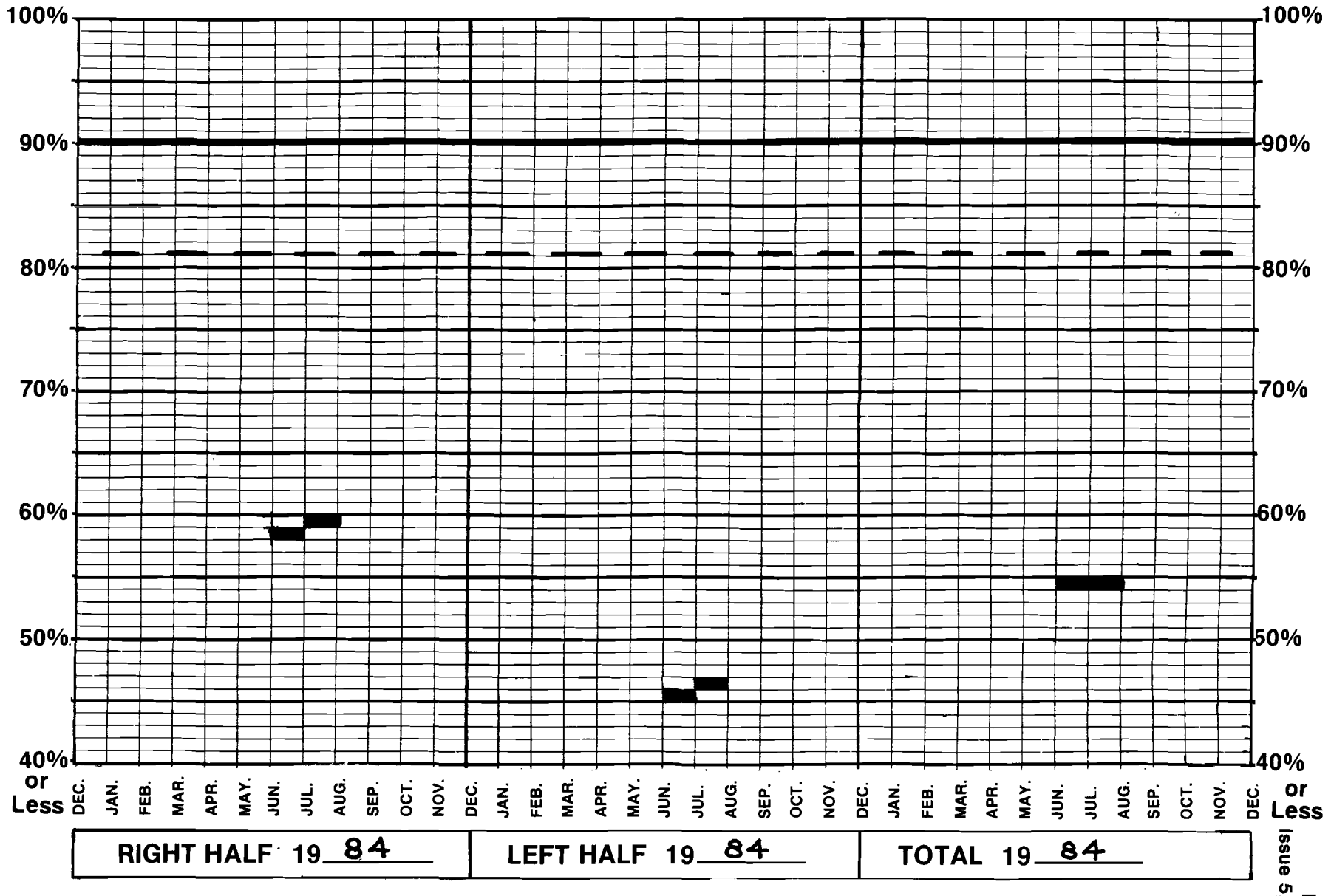


Figure 12 - 1 ESS Word Usage Chart (Worksheet PSV-5) Example (5.06, 5.14, 5.22)

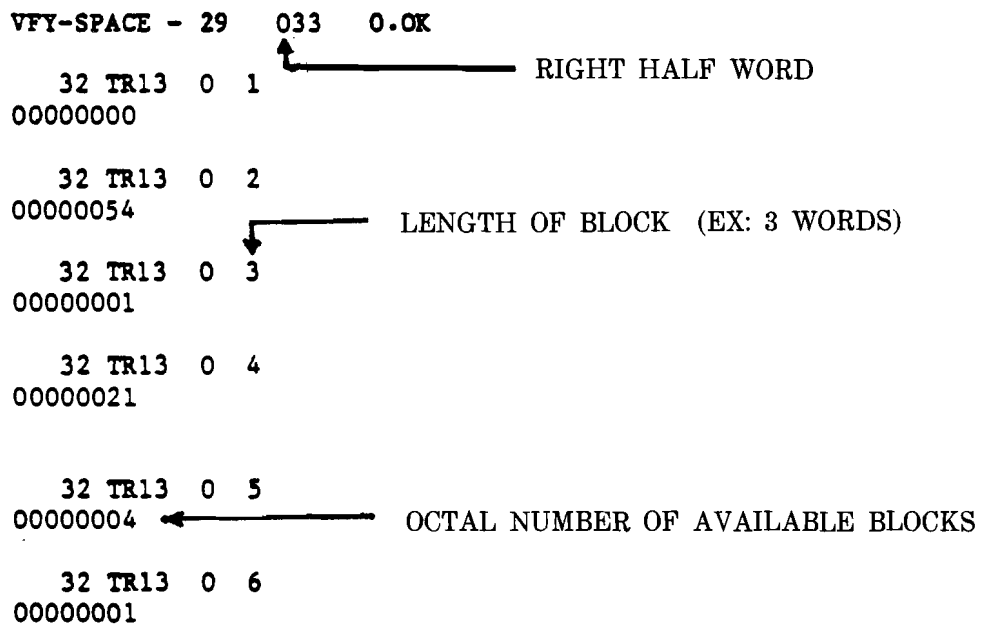


Figure 13 - Right Half (01 Through 31) Length of Block Output Message TR13 (5.09, 5.10)

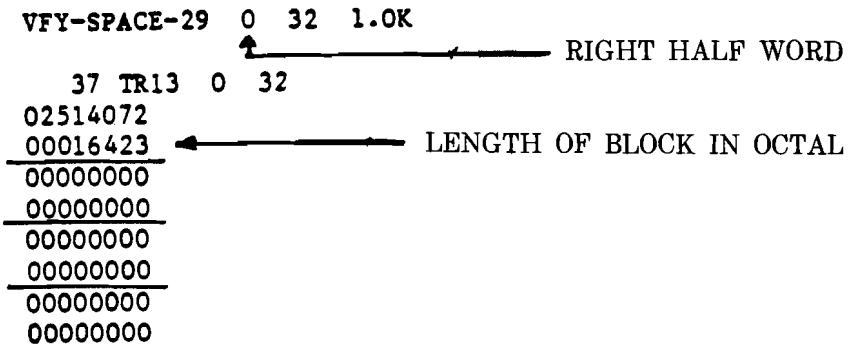


Figure 14 - Right Half (32 or Greater) Length of Block Output Message TR13 (5.09, 5.10)

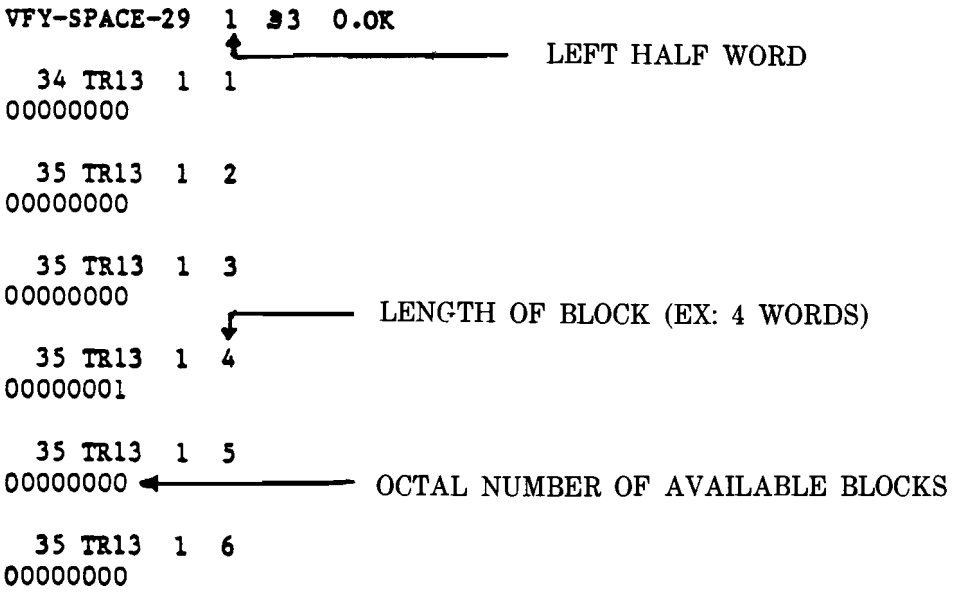


Figure 15 - Left Half (01 Through 31) Length of Block Output Message TR 13 (5.09, 5.10)

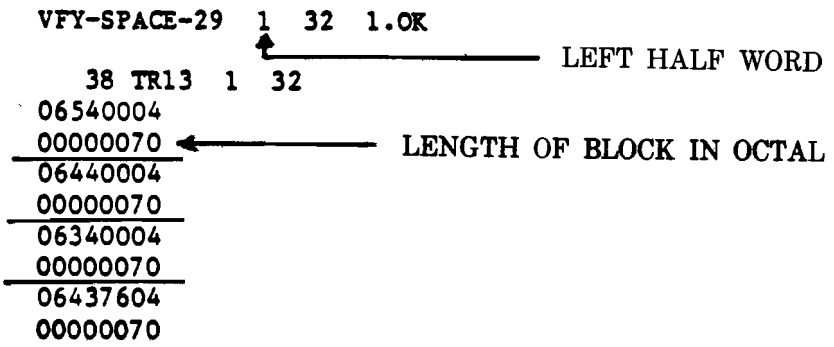


Figure 16 - Left Half (32 or Greater) Length of Block Output Message TR13 (5.09, 5.10)

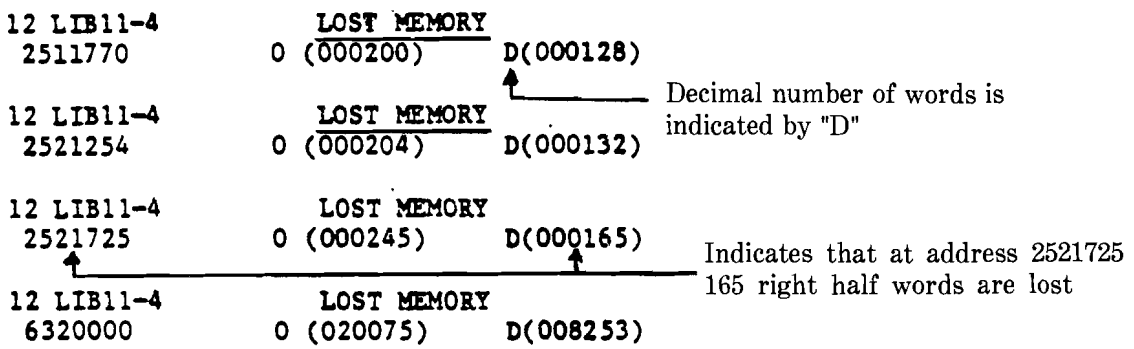


Figure 17 - Example of XLCK Printout (5.18)

DESCRIPTION	SET CARD	FORM
Multiline Group	MHG	1106
Hotel-Motel Register	NHM	1106†
Centrex Groups	CTG	1110
Console Groups	CNSG	1110
Call Pick-up Groups	PUG/TAI	1108
Automatic Queue Trunk and Line	AQTLG	1510
Queue Register	NQR	1510
Simulated Facilities Group	SFG	1210

Figure 18 - Line Assignment Related Set Card Values Examples (6.17, 6.18)