Mullard

signetics
ICs from Mullard

TECHNICAL
INFORMATION

52

Prometheus manual

Prometheus manual

Mullard Limited, Mullard House, Torrington Place, London WC1E 7HD

TP1604

1977

Telephone 01-580 6633 Telex 264341

Printed in the United Kingdom
by Lansdowne Press (Lambeth) Ltd.

Introduction

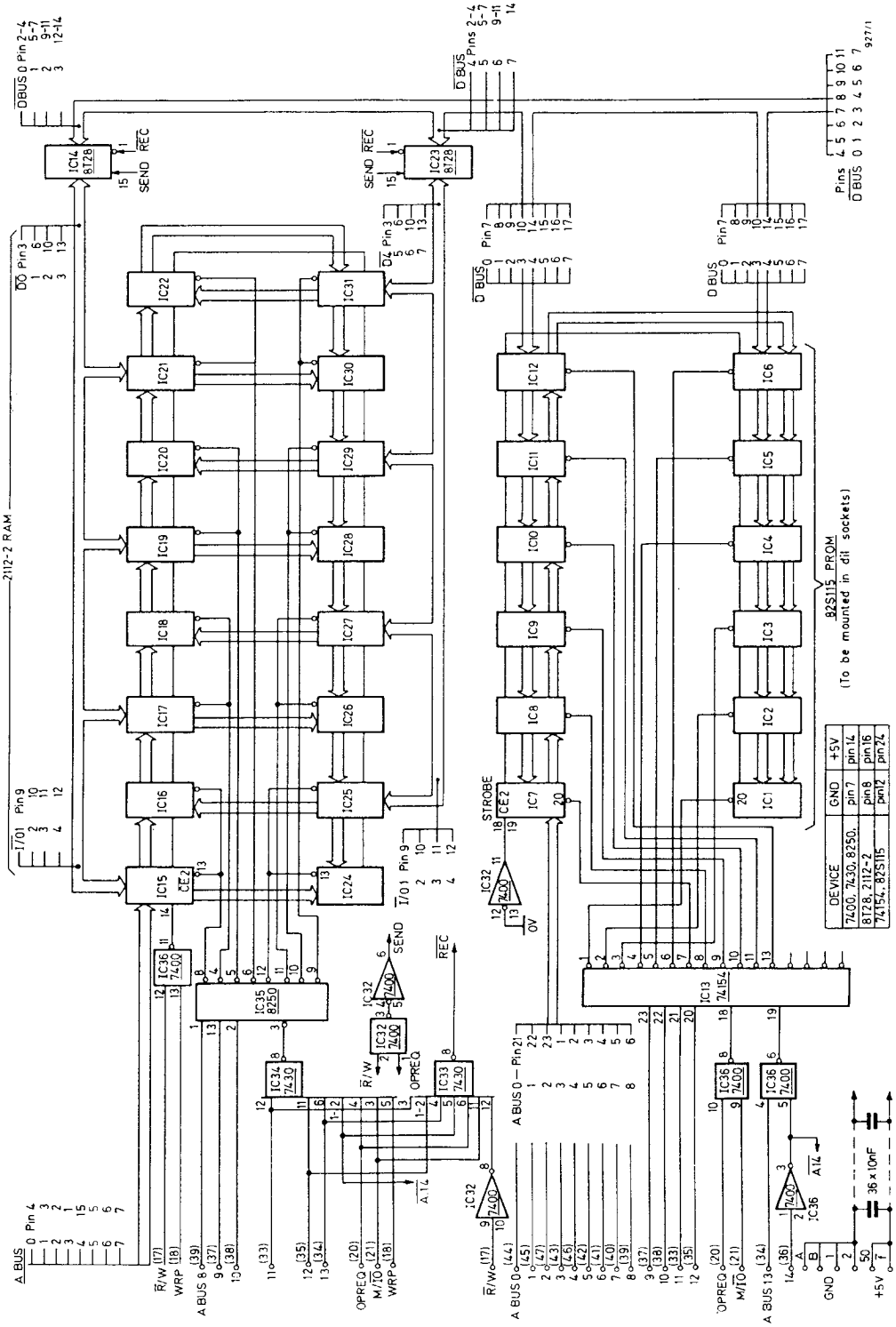


Fig. 1 – Schematic block diagram of the Prometheus board

INTRODUCTION

The Signetics IC marketing group of Mullard has introduced a range of design aids to assist the user of the 2650 microprocessor unit, and the range is continually being developed and extended. The 'Prometheus' resident assembler (order number 2650PC1600SC) is a further stage in this development, and offers simplified program assembly facilities to the system designer.

The Prometheus system consists of a printed-wiring board on which 11 PROMs containing the Prometheus assembler program are mounted, together with 16 RAM ICs for use as storage during program assembly. The assembler has been designed for use with paper tape, and so input and output are transmitted via a teletype, although a fast paper-tape reader may be used to advantage if one is available. To assist the user who wishes to use a fast reader, an extra socket has been included on the Prometheus board for a PROM containing a tape-reader control program.

A schematic diagram of the Prometheus board is shown in Fig.1, and a photograph of the board itself in Fig.2.

The Prometheus program is an assembler which accepts a program written in 2650 Assembly Language as input, and produces a tape containing a hexadecimal translation of the program. This hexadecimal tape has a format suitable for input to the PC1001 or ABC1500 prototyping boards (see Ref.1), via the PIPBUG control program (Ref.2) which is included on both these boards. The assembler is a three-pass type; that is the entire assembly language program is scanned three times by the assembler. On the first pass all the symbols defined by the user (up to a maximum of 365) are assigned values and stored in the RAMs on the Prometheus board, and simple errors such as invalid symbols detected. During the second pass the internal logic of the program is checked and any further errors detected, the line-by-line assembly is performed, and a full listing of the program, including any error messages, is printed out. On the third pass the hexadecimal tape is punched, and a corresponding hexadecimal listing produced for reference.

The Prometheus assembler program introduces several new features, the most important being four new error messages, 20 predefined symbols, and a new assembler directive LIBR (see later section). This directive enables the user to assemble several tapes onto one hexadecimal tape as part of the same program; this facilitates the creation of subroutine 'libraries'. The assembler also makes patching of a program in RAM easier by assembling three NOP (no operation) bytes for a line containing an error, so that these bytes may be altered without changing the memory locations of the rest of the bytes of the program.

This manual gives details of the procedure required to produce a correctly assembled hexadecimal object tape using Prometheus, and includes sections on the installation of the Prometheus board, the writing of a program in 2650 Assembly Language, the production of a source tape containing the assembly language program, and step-by-step instructions for the actual assembly process. An appendix gives details of a paper-tape editor program available for use with Prometheus

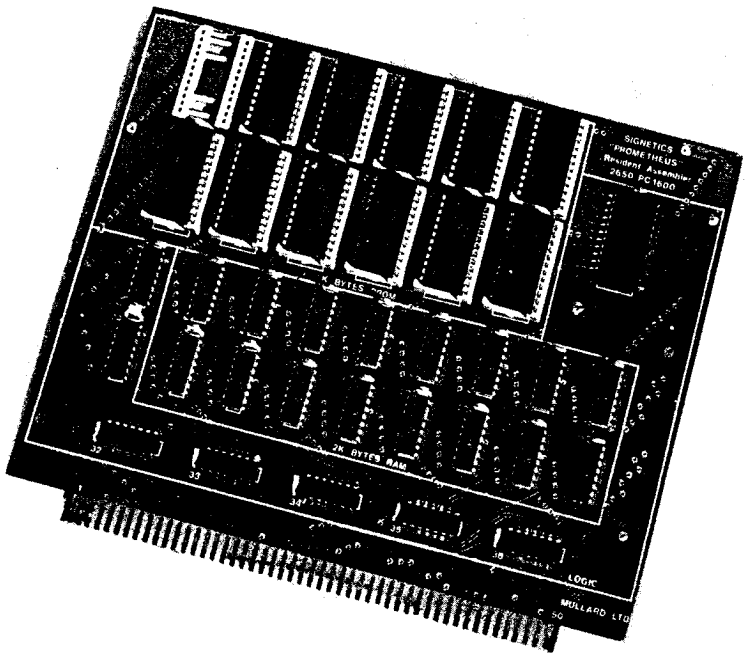


Fig.2 — The Prometheus printed-wiring board

Installation

TABLE 1

Pin Connections

Function	Prometheus		PC1001 or ABC1500
Component side			
GND	Pin 1	connected to pin	1
GND	2		2
$\overline{\text{DBUS0}}$	4		4
$\overline{\text{DBUS1}}$	5		5
$\overline{\text{DBUS2}}$	6		6
$\overline{\text{DBUS3}}$	7		7
$\overline{\text{DBUS4}}$	8		8
$\overline{\text{DBUS5}}$	9		9
$\overline{\text{DBUS6}}$	10		10
$\overline{\text{DBUS7}}$	11		11
$\overline{\text{R}}$/W	17		17
WRP	18		18
OPREQ	20		20
M/$\overline{\text{IO}}$	21		21
ABUS11	33		33
ABUS13	34		34
ABUS12	35		35
ABUS14	36		36
ABUS9	37		37
ABUS10	38		38
ABUS8	39		39
ABUS7	40		40
ABUS6	41		41
ABUS5	42		42
ABUS3	43		43
ABUS0	44		44
ABUS1	45		45
ABUS4	46		46
ABUS2	47		47
+5V	50		50
Reverse side			
GND	A		A
GND	B		B
+5V	$\overline{\text{f}}$		$\overline{\text{f}}$

INSTALLATION OF PROMETHEUS

Before the Prometheus assembler can be used, the Prometheus board must be interconnected with a prototyping board (PC1001 or ABC1500, see Ref.1) and with suitable input, output, and control devices. This section describes the modifications to the system hardware required for correct operation of the assembler.

One method of interconnecting Prometheus with the PC1001 or ABC1500 is by use of the DS2000 base (see Ref.3). This is used as a mounting for the prototyping board, and the Prometheus board fits into the memory extension socket of the base. Once this is done, Prometheus is correctly interconnected with the prototyping board; connection to the input and output devices described below is simplified by the provision of various sockets on the base which bring out signals from the prototyping board to more accessible positions. However, the DS2000 is not essential, and once Prometheus has been connected with the PC1001 or ABC1500 as shown in Table 1, the various input and output functions described in this section may be implemented with reference to Ref.1, which gives the pin positions of the signals available from the prototyping boards.

The DS2000 includes a suitable power supply for both the prototyping board and the Prometheus board; if this base is not available, a power supply of 4A at 5V is required.

Two types of input device are required to use Prometheus, one to read the assembly language source tape and one to control the assembly process. The teletype tape reader or a fast paper-tape reader may be used for the first purpose, and the teletype keyboard is used for the second. The output devices are the teletype punch for the hexadecimal object tape and the teletype printer for the program listing.

If the teletype tape reader is to be used to read the source tape, it must be possible to advance the reader one step at a time so that Prometheus reads the source tape character-by-character. This is achieved by using a buffered relay to control the single-step facility of the teletype, driven by a bit set in an output register by the Prometheus program. If a fast tape reader is to be used an additional software package is required, the details of which depend on the type of reader. An empty socket is provided on the Prometheus board for a PROM containing the tape-reader control routine.

The details of the connection of Prometheus to the various input and output devices described above depend on the particular prototyping board used, and these are considered separately below.

USING THE PC1001

The PC1001 has one serial input/output port and two parallel non-extended input/output ports; the connection of these to external devices is described in the following sections.

Connection to source tape input devices

Teletype tape reader

As mentioned above, the tape reader must be advanced one character at a time, and the Prometheus program sets bits in the output register of non-extended output port C (OPC) to control the advance of the reader. The PIPBUG program (Ref.2) and Prometheus use OPC bit 7 for this purpose; for reader control by Prometheus only, OPC bit 6 is used. A buffer circuit and relay driver are required, the details of which depend on the relay to be used. However, a suitable buffer and driver are provided on the PC1001 for OPC7, and these may be used. If reader control by OPC6 is required, the following modification is suggested. Cut the printed track (on the non-component side of the board) between IC_{39} pin 8 and the feedthrough to IC_{34} pin 2, which is just above and between IC_{39} and IC_{40}; the link between IC_{39} pin 8 and edge contact h should not be broken. A wire jumper from the feedthrough to IC_{39} pin 11 should then be connected (see Fig.3); the tape reader control relay may

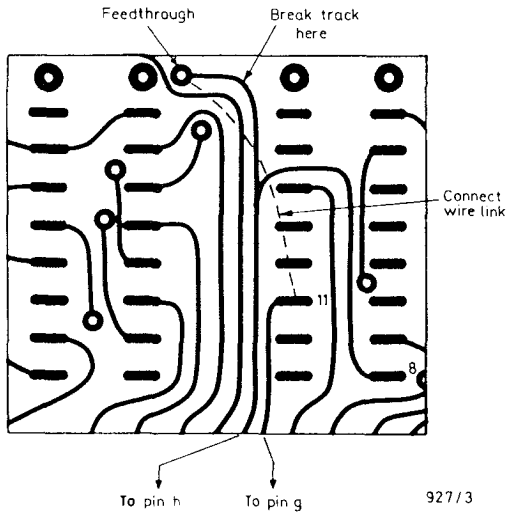


Fig.3 – Modifications to the PC1001 for use with Prometheus; the non-component sides of IC_{39} (right) and IC_{40} (left) are shown

then be driven from edge contact W. The driver IC_{34} will drive a suppressed 5V relay directly. If a higher voltage relay is selected, a separate buffer circuit must be fitted.

These modifications do not affect the operation of the PC1001 except when it is used with Prometheus.

Note: Those teletypes without a reader control facility may be modified in principle, by using the relay contacts to operate the 'reader-trip magnet'.

Fast tape reader

An additional PROM containing a reader control routine is required for this device, the details of which depend

on the particular reader. This PROM must be blown *INVERTED*, as the PROMs containing the Prometheus program are, and the routine must start at memory location 2000_{16}. In this case no relay or buffer circuit is required. A possible example would be to use OPC0 to control the tape drive, non-extended input port D (IPD) bits 0 to 6 to read in bits 0 to 6 of the character, and IPD7 to read the sprocket.

Connection to serial input/output devices

20mA current loop interface

The 20mA current loop receiver on the PC1001 (pins P and R) has a high impedance, and external resistors and a diode must be added as shown in Fig.4. This ensures a 20mA current path, and the additional circuitry may be mounted on the edge connector or mounting base of the PC1001. The 20mA drive is taken from pins S and T.

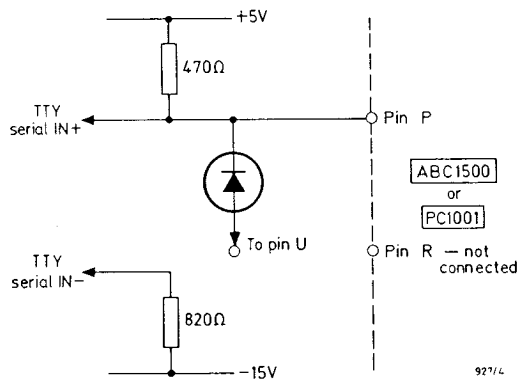


Fig.4 — Added circuitry to ensure a 20mA current path for the teletype receiver on the PC1001 or ABC1500

RS232 or V24 interface

If an RS232 or V24 terminal is used, this is simply connected to pins U, V, and Y of the PC1001 and the appropriate wire jumpers selected; this is described in Ref.4.

USING THE ABC1500

The ABC1500 (see Ref.5) has one serial input/output port and two parallel non-extended ports, each of which may be connected as an input or output port. The connection of these is described in the following sections.

Connection to source tape input devices

Teletype tape reader

As for the PC1001, a buffered relay and driver are required to advance the tape reader one step at a time. However, no driver or buffer is provided on the ABC1500 board, and must be added externally. A suitable driver is the Signetics N7406, which can sink up to 40mA, and this driver should be connected between pins h and W (for OPC7) or g and W (for OPC6). Port C must be connected as an output port by earthing the $\overline{\text{RBAC}}$ signal; a wire jumper is provided on the ABC1500 for this purpose (see Ref.5). The N7406 driver will drive a suppressed relay of up to 30V, and the relay coil should be returned to a suitable positive supply voltage.

Fast tape reader

The procedure described for the PC1001 should be followed for the use of this device; if the example given in the section on the fast tape reader is used, port D must be connected as an input port as well as port C being connected as an output port as described above. Port D is used in this way by earthing the $\overline{\text{RBAD}}$ and $\overline{\text{WBAD}}$ signals, using the wire jumpers provided (see Ref.5).

Connection to serial input/output devices

20mA current loop interface

The circuit shown in Fig.4 should also be used for the ABC1500 20mA receiver to ensure a 20mA current path, as for the PC1001.

RS232 or V24 interface

As for the PC1001, pins U, V, and Y are used to connect the ABC1500 with an RS232 or V24 type terminal, and the appropriate wire jumpers selected (see Ref.5).

2650
assembly language

This section describes the symbolic language in which a program must be written before assembly by Prometheus.

Before beginning to write a program in the 2650 assembly language, it is necessary to understand the way in which the memory of the microprocessor is organised and how it may be accessed; and also to understand the facilities available to help the programmer. This section gives brief details of these topics, and further information is available in Ref.6.

MEMORY ORGANISATION

The 2650 microprocessor has a maximum memory addressing capacity of $32\,768_{10}$ locations, as this is the number of possible combinations of 15 bits which may be fed to the 15-bit address bus of the processor. However, most processor instructions requiring direct access to memory have 13 bits available for the memory address (to allow indexing), giving only 8192_{10} possible locations. In order that the full addressing capability of the processor could be used, a paging system was implemented. In this system the 13 bits specified by a direct memory access instruction correspond to pins ADR0 to ADR12 on the 2650, and pins ADR13 and ADR14 correspond to two bits specifying a page of memory. In this way:

00 – Page 0, Locations 0_{10} to 8191_{10},

01 – Page 1, Locations 8192_{10} to 16383_{10},

10 – Page 2, Locations 16384_{10} to 24575_{10},

11 – Page 3, Locations 24576_{10} to 32767_{10}.

For example, the address (on pins ADR0 to ADR14) 010000001101101 refers to location 109_{10} in page 1.

These page bits may not be set directly by any processor instruction, but are set when certain instructions which specify 15-bit addresses are executed (see Instruction Set). Once the page bits are set, they are fixed at that value until another instruction including a 15-bit address specification is executed; for this reason instruction specifying 13-bit addresses may only address a location within the page specified by the page bits at the time the instruction is executed. However, it is possible for an instruction to access locations across page boundaries by using indirect addressing, a method described in a later section.

It should be noted that the RESET signal or any interrupt from an external device clears the page bits to zero.

INTERNAL REGISTERS

The 2650 contains various internal registers which the processor uses during the execution of any instruction (see Ref.6). When writing a program it is not necessary to take all of these registers into consideration, as the only registers which may be directly affected by program instructions are the seven general-purpose registers and the Program Status Word, or PSW. These are described below; their use may be fully understood by familiarity with the 2650 Instruction Set.

GENERAL-PURPOSE REGISTERS

The seven 8-bit general-purpose registers are arranged in two banks of three, with one register, called Register Zero, outside these banks. The Register Select bit in the PSW (see later) selects one bank which is then available for use by the programmer; Register Zero is always available. The registers are used for intermediate storage of operands required for processor instructions, for the storage of operation results, and for the input and output of data.

PROGRAM STATUS WORD

The PSW is a 16-bit register which contains status and control information. It is divided into two 8-bit bytes called the Program Status Upper (PSU) and Program Status Lower (PSL). The bits in the PSW are affected by various processor instructions, and the significance of each bit is described below: the location of each bit in the PSW is shown in Figs.5 and 6, and details of the bits affected by an instruction are given under the description of the instruction in the Instruction Set section.

7	6	5	4	3	2	1	0
S	F	II	Not used	Not used	SP2	SP1	SP0

PSU

Fig.5 – Bit locations in the Program Status Upper (PSU)

7	6	5	4	3	2	1	0
CC1	CC0	IDC	RS	WC	OVF	COM	CAR

PSL

Fig.6 – Bit locations in the Program Status Lower (PSL)

PSU

S – Sense

The Sense bit reflects the logic state of pin 1 of the 2650, and is not affected by any program instruction.

F – Flag

The Flag bit is a simple latch which drives the Flag output (pin 40) of the 2650.

II – Interrupt Inhibit

When the Interrupt Inhibit bit is a logic '1', the processor will ignore any interrupts from external devices (see Ref.6); when it is '0' and an interrupt occurs, this bit is

changed to a '1' by the interrupt acceptance mechanism to avoid conflict between interrupts.

SP – Stack Pointer
The three Stack Pointer bits are used to specify locations in the Return Address Stack (see Ref.6), and to designate the stack level which contains the present return address. They act as a binary counter which is incremented by branches to subroutines or by interrupts, and decremented by returns from subroutines (see Instruction Set); it is not normally desirable for the programmer to change these bits directly.

PSL

CC – Condition Code
The Condition Code bits are set by the processor whenever a general-purpose register (see earlier section) is loaded or modified by the execution of a program instruction. In addition, the bits are set to represent the relative value of two bytes when they are compared. The CC settings produced by each instruction are given in the Instruction Set section. The CC bits are never set to '11' by normal processor operations.

IDC – Interdigit Carry
It is sometimes essential to know whether there was a carry from bit 3 to bit 4 of a byte during a BCD arithmetic operation. The Interdigit Carry bit contains the carry or borrow out of bit 3 after any add or subtract instruction. In addition, the IDC bit is set when the contents of a register are rotated and the WC bit (see later) is a '1'; in this case the IDC bit reflects the same information as bit 5 of the rotated register.

RS – Register Select
As described earlier, two banks of general-purpose registers are available besides Register Zero. The Register Select bit selects one of the two banks, and indicates the bank currently in use. When RS is '0' the three registers in bank 0 are available, and when RS is '1' those in bank 1 are available.

WC – With/Without Carry
The With/Without Carry bit controls the execution of add, subtract, and rotate instructions. If WC is set to '1', the value of the Carry bit (CAR, see later) is taken into account when an add or subtract instruction is executed. In this way add with carry and subtract with borrow are possible. If WC is '0', the value of CAR is ignored. When WC is '1' and the contents of a register are rotated, the CAR bit is combined with the register to perform a 9-bit rotate (detailed in Instruction Set); the OVF bit (see below) is set if bit 7 of the rotated register changes its value from '0' to '1', and the IDC bit is set as described earlier. If WC is '0', a rotate instruction affects only the eight bits in the register being rotated.

OVF – Overflow
The Overflow bit is set to '1' by add or subtract operations, in the following situations:

Add operation
the two arguments of the instruction have the same sign and the result has the opposite sign;
Subtract operation
the two arguments of the instruction have opposite signs and the result has the same sign as the number being subtracted (the subtrahend).

The OVF bit may also be changed by rotate instructions, as described in the section on the WC bit.

COM – Compare
The Compare bit determines the type of comparison that is performed when a compare instruction (see Instruction Set) is executed. If COM is '1', the comparison is logical and the bytes compared are treated as 8-bit positive binary numbers; if COM is '0', the comparison is arithmetic and the bytes are treated as 8-bit two's complement numbers.

CAR – Carry
The Carry bit is set by the execution of an add or subtract instruction resulting in a carry or borrow out of the high-order bit. CAR is set to '1' by an add instruction generating a carry, or by a subtract instruction *not* generating a borrow; conversely, CAR is set to '0' by an add instruction *not* generating a carry, or by a subtract instruction generating a borrow.

PROGRAM STATEMENTS

A program written in 2650 Assembly Language consists of a sequence of program statements, each containing an instruction either to the processor or to the assembler, and any extra information required to execute the instruction. Each statement is made up of characters, and these characters must be recognisable by the Prometheus program. The assembler recognises all the printing characters on the teletype keyboard except the following:

\ back slash	[left square parenthesis
↑ up arrow	] right square parenthesis

Note: The ← character may be used, but only for error correction while punching the source tape (see later); it may not be used as part of a program statement.

Prometheus also recognises the following non-printing characters:

SPACE	
RETURN	carriage return
LINE FEED	advance listing one line
CONTROL + X	hold down control key and type X.

The use of these characters is described in the section on the production of a source tape.

Statement format

Every statement in a 2650 Assembly Language program has a particular format, and consists of up to 72 valid characters divided into four sections, or *fields*. These fields, shown in Fig.7, must be separated by at least one space, and contain no embedded spaces, but apart from these there are no restrictions on the layout of a statement.

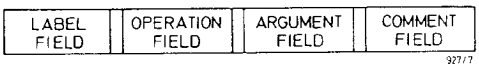


Fig.7 – Program statement fields

The fields each have a specific purpose, and each field is described separately below.

Label field

The label field optionally contains a symbolic name, to which the assembler assigns either the value of the address in memory of the first byte of the operation field, or a numerical value defined by the programmer by use of the EQU assembler directive (see Assembler Directives). In this way the symbolic name, or *label*, represents a particular value, and whenever the assembler recognises this symbol in a program it replaces the label by the appropriate value.

A valid label must:

1) be made up of alphanumeric characters (A to Z, 0 to 9): a maximum of four characters is permitted;
2) begin in logical column 1, that is, it must not be preceded by spaces in a statement;
3) start with an alphabetic character;
4) contain no embedded spaces, as these would be taken by the assembler to be field terminators.

Examples: NUM1, BUFF, PJ01 are valid labels; 1NUM (begins with numeric), BUFFER (over 4 characters), and PJ 1 (embedded space) are invalid labels.

The use of labels enables the programmer to identify the location in memory of a particular instruction without knowing the actual address; this is useful if the order of statements in a program are changed, as the assembler automatically assigns the label to the new physical address of the labelled statement.

Operation field and Argument field

The operation field and argument field contain the actual instruction to the processor or the assembler, and include all the information necessary for its execution. The operation field contains a mnemonic code representing a 2650 processor operation or an assembler directive; in addition, this field may specify a general-purpose register or a Condition Code setting in the PSW. The argument field contains further necessary information, which may be a general-purpose register, an address in memory, a logic mask (that is a sequence of '1's and '0's), or a numerical constant.

Comment field

The comment field contains any valid characters in any combination, and is merely reproduced by the assembler on the listing. It has no effect on the processor, and is used to explain the purpose of the particular statement to which it refers.

An entire statement may be taken as comment if desired; an asterisk (*) typed in logical column 1 means that the entire line following the asterisk is taken as the comment field.

PROCESSOR INSTRUCTIONS

Before considering the Instruction Set, it is important to understand the various possible formats for processor instructions; these are considered below.

Addressing modes

Register addressing

All instructions using register addressing are one byte in length, six bits specifying the particular processor instruction and two bits specifying a general-purpose register; this format is shown in Fig.8. As only two bits are available for the register designation, only four registers may be specified. These are:

Bit 1	Bit 0	Specified Register	
0	0	Register Zero	
0	1	Register One	) of currently
1	0	Register Two	) selected
1	1	Register Three	) bank

Some register addressing instructions, such as a register rotation, require only one operand, and in these cases any general-purpose register in the current bank, or Register Zero, may be specified.

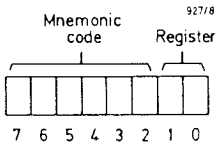


Fig.8 – Format for register addressing instructions

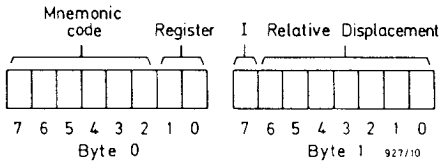


Fig.10 – Format for relative addressing instructions

For instructions requiring two operands, such as the addition of two registers, one operand is always contained in Register Zero and the other is contained in a register of the currently selected bank.

The form in which register addressing instructions are written in a program depends on the number of operands used by the instruction. If there is only one operand both the mnemonic and the register specification are written in the operation field, separated by a comma. If there are two operands the mnemonic appears in the operation field and the register specification in the argument field, separated by at least one space. This is shown for each register addressing instruction in the detailed Instruction Set section.

Immediate addressing

All immediate addressing instructions are two bytes in length, and have the format shown in Fig.9. Byte 0 contains the mnemonic code and a register specification, and byte 1 contains data for use during the execution of

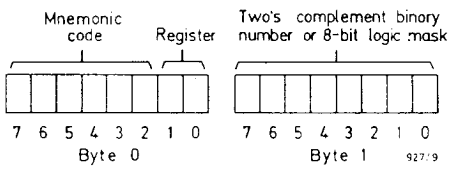


Fig.9 – Format for immediate addressing instructions

the instruction. This data may be an 8-bit two's complement binary number or an 8-bit logic mask, depending on the particular instruction to be executed. Any register may be designated in the first byte. As before, the way immediate addressing instructions are written in a program is given in the detailed Instruction Set section.

Relative addressing

Relative addressing instructions are two bytes in length, and specify particular memory locations. The format is shown in Fig.10; byte 0 contains a mnemonic code and a register designation, and byte 1 contains a 7-bit two's complement binary number (bits 0 to 6, byte 1) which can range from –64 to +63. The arguments of a relative addressing instruction are the contents of the designated register and the contents of a memory location, the address of which is calculated by adding the 7-bit number in byte 1 to the address of the byte immediately following byte 1.

Bit 7, byte 1, is an indirect addressing indicator; if this is set to a '1' the processor implements an indirect addressing cycle (see later).

Two branch instructions (see ZBSR, ZBRR in Instruction Set) allow addressing relative to page 0, byte 0 of memory. In these cases, values up to +63 reference the first 63 bytes of page 0, and values down to – 64 reference the last 64 bytes of page 0.

Absolute addressing for branch instructions

Absolute addressing instructions are all three bytes in length, and are memory reference instructions; the format is shown in Fig.11. Byte 0 contains the 6-bit mnemonic code and two bits specifying either a general-purpose register or a Condition Code setting, specifying the quantity to be tested for the branch condition. The individual instruction descriptions should be consulted for further information.

Bit 7, byte 1, is again an indirect addressing indicator (see later); the remainder of byte 1 and all byte 2 are used for a 15-bit memory address. Bits 5 and 6 of byte 1 are used to set the page bits, and so enable the program to branch to locations outside the current page. This was described in the section on memory organisation of the 2650.

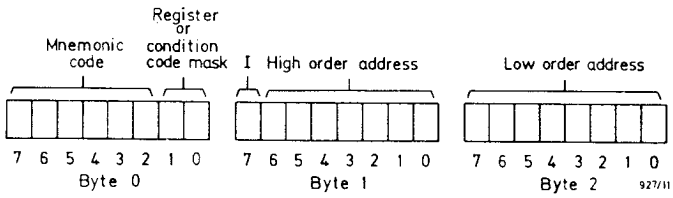


Fig.11 – Format for absolute addressing branch instructions

Absolute addressing for non-branch instructions

This form of absolute addressing adds a new facility, called indexed addressing. As for branch instructions, this format uses three bytes, and is shown in Fig.12. Byte 0 contains a mnemonic code and a register specification as before; bit 7, byte 1, is an indirect addressing indicator (see later); bits 6 and 5, byte 1, are index control bits; and the remaining 13 bits contain a memory address. It will be seen that this format is the same as the branch instructions using absolute addressing except that

Indirect addressing

The indirect addressing mode may be specified in instructions using absolute or relative addressing, and is a means of addressing across page boundaries. If bit 7, byte 1, of absolute or relative addressing instructions (see Figs.10, 11, and 12) is set to a '1', the address of the argument is found in the byte indicated by the absolute or relative address section of the instruction, and its successor. In this way, the 13-bit address contained in an absolute addressing instruction may be used to identify a 15-bit

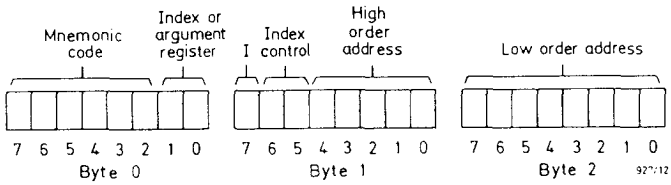


Fig.12 — Format for absolute addressing non-branch instructions

the page bits have been replaced by the index control bits, the use of which is explained below; therefore only addresses within the current page of memory may be accessed directly.

The index control bits (bits 6 and 5, byte 1) allow the programmer to address a memory location which depends on the contents of a register. Their significance is shown in the following table.

Bit 6	Bit 5	Meaning
0	0	Non-indexed address
0	1	Indexed with auto-increment
1	0	Indexed with auto-decrement
1	1	Indexed only

When the index control bits are both zero, there is no indexing, and the arguments of the instruction are the register specified in bits 1 and 0, byte 0, and the contents of the location pointed to by the 13-bit address in bits 4 to 0, byte 1, and bits 7 to 0, byte 2. When the control bits are both one, bits 1 and 0, byte 0, designate an index register, and the operand register becomes Register Zero. The address of the argument is calculated by adding the contents of the index register (treated as an 8-bit absolute integer) to the 13-bit address in the instruction.

Setting the index control bits to '0' and '1' or '1' and '0' means that auto-increment or auto-decrement is specified; in these cases a binary '1' is either added to (auto-increment) or subtracted from (auto-decrement) the index register before its contents are added to the 13-bit address.

address, enabling an absolute addressing instruction to specify any location in any page of memory.

If indexing is used as well as indirection, the value of the index register is added to the final 15-bit address, and not to the 13-bit address contained in the instruction; this is called *post-indexing*.

2650 instruction set

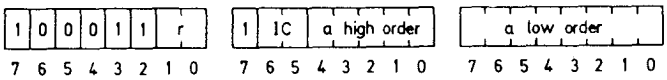
This section gives a detailed description of each 2650 processor instruction. For each instruction, its full name and the type of addressing is given, together with the binary code and a 'mnemonic' section showing how the instruction is actually written in a program. The instructions are arranged in alphabetical order of mnemonic.

In this section, the following symbols are used:

1) r general-purpose register (including Register Zero),
2) a 13-bit address specification or relative address displacement,
3) v binary number or logic mask,
4) * indirect address indicator,
5) ,X indexed addressing indicator; index register specification.

The indirect and indexed addressing indicators are shown in brackets in the instructions, as they are optional. If one of the indicators is used, the brackets are omitted. For example, the first instruction, ADD ABSOLUTE, would be written ADDA,r *a,X if indirect addressing and indexed addressing were both specified; X represents the index register.

ADD ABSOLUTE



Mnemonic – ADDA,r (*) a (,X)

Addressing mode – absolute addressing; indirect and/or indexed addressing may be specified

Execution time – 4 cycles (12 clock periods)

This three-byte instruction causes the contents of register r and the contents of the byte of memory pointed to by the 13-bit address to be added together in a full binary adder. The 8-bit sum replaces the contents of register r.

If indexing is specified, bits 1 and 0, byte 0, indicate the index register and the destination of the operation becomes Register Zero.

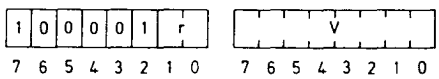
Note: Add with Carry is possible.

Program Status Bits affected – CAR, CC, IDC, OVF

Condition Code setting

Register r	CC1	CC0
Positive	0	1
Zero	0	0
Negative	1	0

ADD IMMEDIATE



Mnemonic – ADDI,r v

Addressing mode – immediate addressing

Execution time – 2 cycles (6 clock periods)

This two-byte instruction causes the contents of register r and the contents of the second byte of the instruction to be added together in a full binary adder. The 8-bit sum replaces the contents of register r.

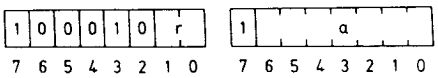
Note: Add with Carry is possible.

Program Status Bits affected – CAR, CC, IDC, OVF

Condition Code setting

Register r	CC1	CC0
Positive	0	1
Zero	0	0
Negative	1	0

ADD RELATIVE



Mnemonic – ADDR,r (*) a

Addressing mode – relative addressing; indirect addressing may be specified

Execution time – 3 cycles (9 clock periods)

This two-byte instruction causes the contents of register r and the contents of the byte of memory pointed to by the effective address to be added together in a full binary adder. The 8-bit sum replaces the contents of register r.

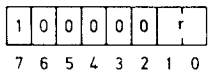
Note: Add with Carry is possible.

Program Status Bits affected – CAR, CC, IDC, OVF

Condition Code setting

Register r	CC1	CC0
Positive	0	1
Zero	0	0
Negative	1	0

ADD TO REGISTER ZERO



Mnemonic – ADDZ r

Addressing mode – register addressing

Execution time – 2 cycles (6 clock periods)

This one-byte instruction causes the contents of the specified register r and the contents of Register Zero to be added together in a full binary adder. The 8-bit sum of the addition replaces the contents of Register Zero. The contents of register r remain unchanged.

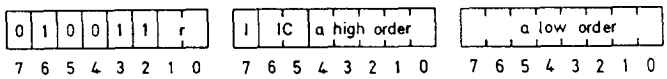
Note: Add with Carry is possible.

Program Status Bits affected – CAR, CC, IDC, OVF

Condition Code setting

Register Zero	CC1	CC0
Positive	0	1
Zero	0	0
Negative	1	0

AND ABSOLUTE



Mnemonic – ANDA,r (*) a (,X)

Addressing mode – absolute addressing; indirect and/or indexed addressing may be specified

Execution time – 4 cycles (12 clock periods)

This three-byte instruction causes the contents of register r to be logically ANDed with the contents of memory byte pointed to by the 13-bit address. The result of the operation replaces the contents of register r.

The AND operation treats each bit of the argument bytes as in the truth table below.

Bit (0 to 7)	Bit (0 to 7)	AND result
0	0	0
0	1	0
1	0	0
1	1	1

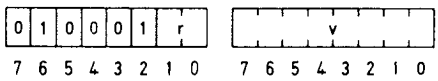
If indexing is specified, bits 1 and 0, byte 0, indicate the index register and the destination of the operation implicitly becomes Register Zero.

Program Status Bits affected – CC

Condition Code setting

Register r	CC1	CC0
Positive	0	1
Zero	0	0
Negative	1	0

AND IMMEDIATE



Mnemonic – ANDI,r v

Addressing mode – immediate addressing

Execution time – 2 cycles (6 clock periods)

This two-byte instruction causes the contents of the specified register r to be logically ANDed with the contents of the second byte of this instruction. The result of this operation replaces the contents of register r.

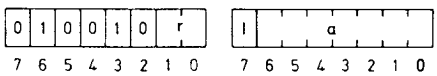
The AND operation treats each bit of the argument bytes as in the truth table shown for the ANDA instruction.

Program Status Bits affected – CC

Condition Code setting

Register r	CC1	CC0
Positive	0	1
Zero	0	0
Negative	1	0

AND RELATIVE



Mnemonic – ANDR,r (*) a

Addressing mode – relative addressing; indirect addressing may be specified

Execution time – 3 cycles (9 clock periods)

This two-byte instruction causes the contents of the specified register r to be logically ANDed with the contents of the memory byte pointed to by the effective address. The result of this operation replaces the contents of register r.

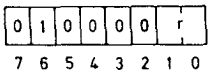
The AND operation treats each bit of the argument bytes as in the truth table shown for the ANDA instruction.

Program Status Bits affected – CC

Condition Code setting

Register r	CC1	CC0
Positive	0	1
Zero	0	0
Negative	1	0

AND WITH REGISTER ZERO



Mnemonic – ANDZ r where r ≠ 0

Addressing mode – register addressing

Execution time – 2 cycles (6 clock periods)

This one-byte instruction causes the contents of the specified register r to be logically ANDed with the contents of Register Zero. The result of the operation replaces the contents of Register Zero. The contents of register r remain unchanged.

The AND operation treats each bit of the argument bytes as in the truth table shown for the ANDA instruction.

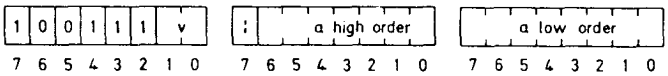
Note: Register r may not be specified as zero. This operation code, '01000000', is reserved for HALT, and Prometheus will indicate a syntax error if this is used.

Program Status Bits affected – CC

Condition Code setting

Register Zero	CC1	CC0
Positive	0	1
Zero	0	0
Negative	1	0

BRANCH ON CONDITION FALSE, ABSOLUTE



Mnemonic – BCFA,v (*) a where v ≠ 3_{16}

Addressing mode – absolute addressing; indirect addressing may be specified

Execution time – 3 cycles (9 clock periods)

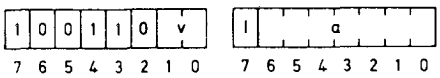
This three-byte instruction causes the processor to fetch the next instruction to be executed from the memory location pointed to by the 13-bit address only if the 2-bit v field does not match the 2-bit Condition Code field (CC) in the Program Status Word. If there is no match, the contents of the Instruction Address Register are replaced by the effective address.

If the v field and CC field match, the next instruction is fetched from the location following the third byte of this instruction.

Note: The v field may not be set to 3_{16} as this bit combination is used for the BXA operation code. If this is attempted, Prometheus will indicate a syntax error and assemble an unconditional BCTA instruction.

Program Status Bits affected – none

BRANCH ON CONDITION FALSE, RELATIVE



Mnemonic – BCFR,v (*) a where v $\neq 3_{16}$

Addressing mode – relative addressing; indirect addressing may be specified

Execution time – 3 cycles (9 clock periods)

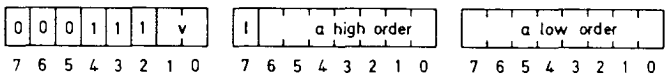
This two-byte branch instruction causes the processor to fetch the next instruction to be executed from the memory location pointed to by the effective address only if the 2-bit v field does not match the 2-bit Condition Code field (CC) in the Program Status Word. If there is no match, the contents of the Instruction Address Register are replaced by the effective address.

If the v field and CC field match, the next instruction is fetched from the location following the second byte of this instruction.

Note: The v field may not be set to 3_{16} as this bit combination is used for the ZBRR operation code. If this is attempted, Prometheus will indicate a syntax error and assemble an unconditional BCTR instruction.

Program Status Bits affected – none

BRANCH ON CONDITION TRUE, ABSOLUTE



Mnemonic – BCTA,v (*) a

Addressing mode – absolute addressing; indirect addressing may be specified

Execution time – 3 cycles (9 clock periods)

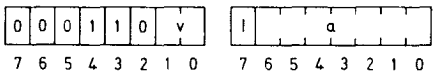
This three-byte conditional branch instruction causes the processor to fetch the next instruction to be executed from the memory location pointed to by the effective address only if the 2-bit v field matches the 2-bit Condition Code field (CC) in the program Status Word.

If the v field and CC field do not match, the next instruction is fetched from the location following the third byte of this instruction.

Note: If the v field is set to 3_{16}, an unconditional branch is effected.

Program Status Bits affected – none

BRANCH ON CONDITION TRUE, RELATIVE



Mnemonic – BCTR,v (*) a

Addressing mode – relative addressing; indirect addressing may be specified

Execution time – 3 cycles (9 clock periods)

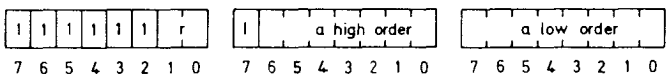
This two-byte conditional branch instruction causes the processor to fetch the next instruction to be executed from the memory location pointed to by the effective address only if the 2-bit v field matches the current Condition Code field (CC) in the Program Status Word.

If the v field and CC field do not match, the next instruction is fetched from the location following the second byte of this instruction.

Note: If the v field is set to 3_{16}, an unconditional branch is effected.

Program Status Bits affected – none

BRANCH ON DECREMENTING REGISTER, ABSOLUTE



Mnemonic – BDRA,v (*) a

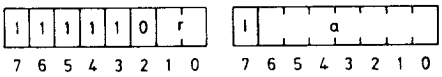
Addressing mode – absolute addressing; indirect addressing may be specified

Execution time – 3 cycles (9 clock periods)

This three-byte instruction causes the processor to decrement the contents of the specified register by one. If the new value in the register is non-zero, the next instruction to be executed is taken from the memory location pointed to by the effective address, that is the effective address replaces the previous contents of the Instruction Address Register. If the new address in register r is zero, the next instruction to be executed follows the third byte of this instruction.

Program Status Bits affected – none

BRANCH ON DECREMENTING REGISTER, RELATIVE



Mnemonic – BDRR,r (*) a

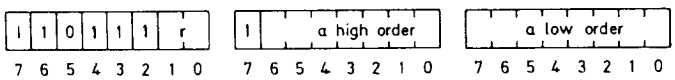
Addressing mode – relative addressing; indirect addressing may be specified

Execution time – 3 cycles (9 clock periods)

This two-byte branch instruction causes the processor to decrement the contents of the specified register by one. If the new value in the register is non-zero, the next instruction to be executed is taken from the memory location pointed to by the effective address, that is the effective address replaces the previous contents of the Instruction Address Register. If the new value in register r is zero, the next instruction to be executed follows the second byte of this instruction.

Program Status Bits affected – none

BRANCH ON INCREMENTING REGISTER, ABSOLUTE



Mnemonic – BIRA,r (*) a

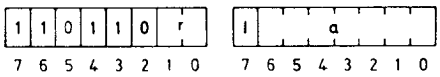
Addressing mode – absolute addressing; indirect addressing may be specified

Execution time – 3 cycles (9 clock periods)

This three-byte branch instruction causes the processor to increment the contents of the specified register by one. If the new value in the register is non-zero, the next instruction to be executed is taken from the memory location pointed to by the effective address, that is the effective address replaces the previous contents of the Instruction Address Register. If the new value of register r is zero, the next instruction to be executed follows the third byte of this instruction.

Program Status Bits affected – none

BRANCH ON INCREMENTING REGISTER, RELATIVE



Mnemonic – BIRR,r (*) a

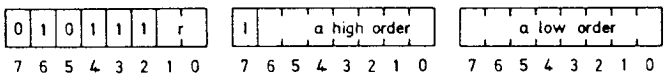
Addressing mode – relative addressing; indirect addressing may be specified

Execution time – 3 cycles (9 clock periods)

This two-byte branch instruction causes the processor to increment the contents of the specified register by one. If the new value in the register is non-zero, the next instruction to be executed is taken from the memory location pointed to by the effective address, that is the effective address replaces the previous contents of the Instruction Address Register. If the new value in register r is zero, the next instruction to be executed follows the second byte of this instruction.

Program Status Bits affected – none

BRANCH ON REGISTER NON-ZERO, ABSOLUTE



Mnemonic – BRNA,r (*) a

Addressing mode – absolute addressing; indirect addressing may be specified

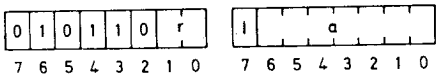
Execution time – 3 cycles (9 clock periods)

This three-byte branch instruction causes the contents of the specified register r to be tested for a non-zero. If the register contains a non-zero, the next instruction to be executed is taken from the location pointed to by the effective address, that is the effective address replaces the contents of the Instruction Address Register.

If the specified register contains a zero, the next instruction is fetched from the location following the third byte of this instruction.

Program Status Bits affected – none

BRANCH ON REGISTER NON-ZERO, RELATIVE



Mnemonic – BRNR,r (*) a

Addressing mode – relative addressing; indirect addressing may be specified

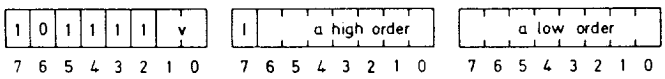
Execution time – 3 cycles (9 clock periods)

This two-byte branch instruction causes the contents of the specified register r to be tested for a non-zero. If the register contains a non-zero, the next instruction to be executed is taken from the location pointed to by the effective address, that is the effective address replaces the current contents of the Instruction Address Register.

If the specified register contains a zero, the next instruction is fetched from the location following the second byte of this instruction.

Program Status Bits affected – none

BRANCH TO SUBROUTINE ON CONDITIONS FALSE, ABSOLUTE



Mnemonic – BSFA,v (*) a where $v \neq 3_{16}$

Addressing mode – absolute addressing; indirect addressing may be specified

Execution time – 3 cycles (9 clock periods)

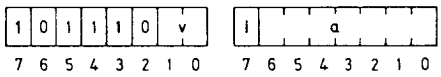
This three-byte conditional subroutine branch instruction causes the processor to perform a subroutine branch only if the 2-bit v field does not match the current Condition Code field (CC) in the Program Status Word. If the fields do not match, the Stack Pointer is incremented by one and the current content of the Instruction Address Register, which points to the location following this instruction, is pushed into the Return Address Stack. The 13-bit address replaces the previous contents of the IAR.

If the v field and the CC match, the next instruction is fetched from the location following this instruction and the SP is unaffected.

Note: The v field may not be coded as 3_{16} as this combination is used for the BSXA operation code. If this is attempted, Prometheus will indicate a syntax error and assemble an unconditional BSTA instruction.

Program Status Bits affected – SP

BRANCH TO SUBROUTINE ON CONDITION FALSE, RELATIVE



Mnemonic – BSFR,v (*) a where v $\neq 3_{16}$

Addressing mode – relative addressing; indirect addressing may be specified

Execution time – 3 cycles (9 clock periods)

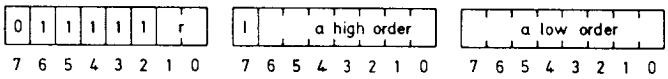
This two-byte conditional subroutine branch instruction causes the processor to perform a subroutine branch only if the 2-bit v field does not match the current Condition Code field (CC) in the Program Status Word. If the fields do not match, the Stack Pointer is incremented by one and the current content of the Instruction Address Register, which points to the location following this instruction, is pushed into the Return Address Stack. The effective address replaces the previous contents of the IAR.

If the v field and the CC match, the next instruction is fetched from the location following this instruction and the SP is unaffected.

Note: The v field may not be coded as 3_{16} because this combination is used for the ZBSR operation code. If this is attempted, Prometheus will indicate a syntax error and assemble an unconditional BSTR instruction.

Program Status Bits affected – SP

BRANCH TO SUBROUTINE ON REGISTER NON-ZERO, ABSOLUTE



Mnemonic – BSNA,r (*) a

Addressing mode – absolute addressing; indirect addressing may be specified

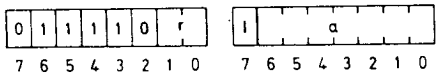
Execution time – 3 cycles (9 clock periods)

This three-byte subroutine branch instruction causes the contents of the specified register r to be tested for a non-zero. If the register contains a non-zero, the next instruction to be executed is taken from the location pointed to by the 13-bit address. Before replacing the current contents of the Instruction Address Register (IAR) with the effective address, the Stack Pointer (SP) is incremented by one and the address of the byte following the instruction is pushed into the Return Address Stack (RAS).

If the specified register contains a zero, the next instruction is fetched from the location following this instruction.

Program Status Bits affected – SP

BRANCH TO SUBROUTINE ON REGISTER NON-ZERO, RELATIVE



Mnemonic – BSNR,r (*) a

Addressing mode – relative addressing; indirect addressing may be specified

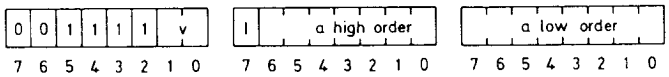
Execution time – 3 cycles (9 clock periods)

This two-byte subroutine branch instruction causes the contents of the specified register r to be tested for a non-zero. If the register contains a non-zero, the next instruction to be executed is taken from the location pointed to by the effective address. Before replacing the contents of the Instruction Address Register with the effective address, the Stack Pointer (SP) is incremented by one and the address of the byte following the instruction is pushed into the Return Address Stack (RAS).

If the specified register contains a zero, the next instruction is fetched from the location following this instruction.

Program Status Bits affected – SP

BRANCH TO SUBROUTINE ON CONDITION TRUE, ABSOLUTE



Mnemonic – BSTA,v (*) a

Addressing mode – absolute addressing; indirect addressing may be specified

Execution time – 3 cycles (9 clock periods)

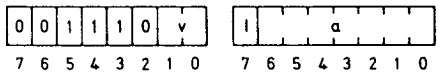
This three-byte conditional subroutine branch instruction causes the processor to perform a subroutine branch only if the 2-bit v field matches the current Condition Code field (CC) in the Program Status Word. If the fields match, the Stack Pointer is incremented by one and the current contents of the Instruction Address Register, which points to the byte following this instruction, is pushed into the Return Address Stack. The 13-bit address replaces the previous contents of the IAR.

If the v field and the CC field do not match, the next instruction is fetched from the location following the third byte of this instruction and the Stack Pointer is unaffected.

Note: If v is set to 3_{16}, the BSTA instruction branches unconditionally.

Program Status Bits affected – SP

BRANCH TO SUBROUTINE ON CONDITION TRUE, RELATIVE



Mnemonic – BSTR,v (*) a

Addressing mode – relative addressing; indirect addressing may be specified

Execution time – 3 cycles (9 clock periods)

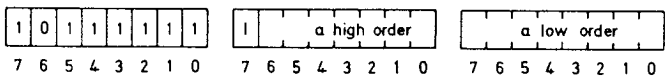
This two-byte conditional subroutine branch instruction causes the processor to perform a subroutine branch only if the 2-bit v field matches the current Condition Code field (CC) in the Program Status Word. If the fields match, the Stack Pointer is incremented by one and the current contents of the Instruction Address Register, which points to the byte following this instruction, is pushed into the Return Address Stack. The effective address replaces the previous contents of the IAR.

If the v field and CC field do not match, the next instruction is fetched from the location following the second byte of this instruction and the SP is unaffected.

Note: If v is set to 3_{16}, the BSTR instruction branches unconditionally.

Program Status Bits affected – SP

BRANCH TO SUBROUTINE, INDEXED, ABSOLUTE, UNCONDITIONAL



Mnemonic – BSXA (*) a,X

Addressing mode – absolute addressing with indexing; indirect addressing may be specified

Execution time – 3 cycles (9 clock periods)

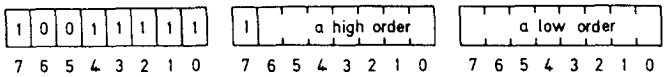
This three-byte instruction causes the processor to perform an unconditional subroutine branch. Indexing is required and register 3 must be specified as the index register because the entire first byte of this instruction is decoded by the processor. If no register is specified, register 3 is assumed to be the index register; if a register other than register 3 is specified, Prometheus will indicate an index error.

Execution of this instruction causes the Stack Pointer (SP) to be incremented by one, the address of the byte following this instruction is pushed into the Return Address Stack (RAS), and the effective address replaces the contents of the Instruction Address Register.

If indirect addressing is specified, the value in the index register is added to the indirect address to calculate the effective address.

Program Status Bits affected – SP

BRANCH, INDEXED, ABSOLUTE, UNCONDITIONAL



Mnemonic – BXA (*) a,X

Addressing mode – absolute addressing with indexing; indirect addressing may be specified

Execution time – 3 cycles (9 clock periods)

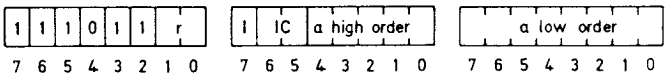
This three-byte branch instruction causes the processor to perform an unconditional branch. Indexing is required and register 3 must be specified as the index register because the entire first byte of this instruction is decoded by the processor. If no register is specified, register 3 is assumed to be the index register; if a register other than register 3 is specified, Prometheus will indicate an index error.

When executed, the contents of the Instruction Address Register (IAR) are replaced by the effective address.

If indirect addressing is specified, the value in the index register is added to the indirect address to calculate the effective branch address.

Program Status Bits affected – none

COMPARE ABSOLUTE



Mnemonic – COMA,r (*) a (,X)

Addressing mode – absolute addressing; indirect and/or indexed addressing may be specified

Execution time – 4 cycles (12 clock periods)

This three-byte instruction causes the contents of register r to be compared with the contents of the memory byte pointed to by the 13-bit address. The comparison will be performed in either the arithmetic or the logical mode depending on the setting of the COM bit in the Program Status Word.

Where COM = 1 (logical mode), the values will be treated as 8-bit positive binary numbers; when COM = 0 (arithmetic mode), the values will be treated as 8-bit two's complement numbers.

If indexing is specified, bits 1 and 0, byte 0, indicate the index register and the destination of the operation implicitly becomes Register Zero.

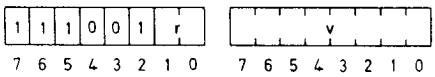
The execution of this instruction causes the Condition Code to be set as in the table below.

Program Status Bits affected – CC

Condition Code setting

Register r	CC1	CC0
Greater than memory byte	0	1
Equal to memory byte	0	0
Less than memory byte	1	0

COMPARE IMMEDIATE



Mnemonic – COMI,r v

Addressing mode – immediate addressing

Execution time – 2 cycles (6 clock periods)

This two-byte instruction causes the contents of the specified register r to be compared with the contents of the second byte of this instruction. The comparison will be performed in either the arithmetic or the logical mode depending on the setting of the COM bit in the Program Status Word.

When COM = 1 (logical mode), the values will be treated as 8-bit positive binary numbers; when COM = 0, the values will be treated as 8-bit two's complement numbers.

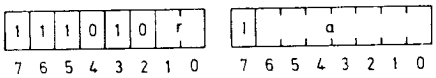
The execution of this instruction causes the Condition Code to be set as in the table below.

Program Status Bits affected – CC

Condition Code setting

Register r	CC1	CC0
Greater than v	0	1
Equal to v	0	0
Less than v	1	0

COMPARE RELATIVE



Mnemonic – COMR,r (*) a

Addressing mode – relative addressing; indirect addressing may be specified

Execution time – 3 cycles (9 clock periods)

This two-byte instruction causes the contents of the specified register r to be compared with the contents of the memory byte pointed to by the effective address. The comparison will be performed in either the arithmetic or the logical mode depending upon the setting of the COM bit in the Program Status Word.

When COM = 1 (logical mode), the values will be treated as 8-bit positive binary numbers; when COM = 0, the values will be treated as 8-bit two's complement numbers.

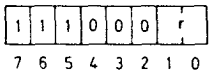
The execution of this instruction causes the Condition Code to be set as in the table below.

Program Status Bits affected – CC

Condition Code setting

Register r	CC1	CC0
Greater than memory byte	0	1
Equal to memory byte	0	0
Less than memory byte	1	0

COMPARE WITH REGISTER ZERO



Mnemonic – COMZ r

Addressing mode – register addressing

Execution time – 2 cycles (6 clock periods)

This one-byte instruction causes the contents of the specified register r to be compared with the contents of Register Zero. The comparison will be performed in either arithmetic or the logical mode depending on the setting of the COM bit in the Program Status Word.

When COM = 1 (logical mode), the values will be treated as 8-bit positive binary numbers; when COM = 0, the values will be treated as 8-bit two's complement numbers.

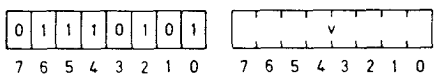
The execution of this instruction causes the Condition Code to be set as in the table below.

Program Status Bits affected – CC

Condition Code setting

Register Zero	CC1	CC0
Greater than Register r	0	1
Equal to Register r	0	0
Less than Register r	1	0

CLEAR PROGRAM STATUS LOWER, SELECTIVE



Mnemonic – CPSL v

Addressing mode – immediate addressing

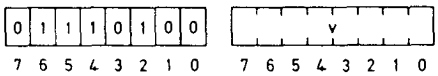
Execution time – 3 cycles (9 clock periods)

This two-byte instruction causes individual bits in the Lower Program Status byte to be selectivity cleared. When this instruction is executed, each bit in the v field of the second byte of this instruction is tested for the presence of a one, and if a particular bit in the v field contains a one, the corresponding bit in the status byte is cleared to zero. Any bits in the status byte which are not selected are not modified.

Program Status Bits affected – CC, IDC, RS, WC, OVF, COM, CAR

Condition Code setting – The CC bits may be cleared by the execution of this instruction

CLEAR PROGRAM STATUS UPPER, SELECTIVE



Mnemonic – CPSU v

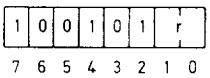
Addressing mode – immediate addressing

Execution time – 3 cycles (9 clock periods)

This two-byte instruction causes individual bits in the Upper Program Status byte to be selectively cleared. When this instruction is executed, each bit in the v field of the second byte of this instruction is tested for the presence of a one, and if a particular bit in the v field contains a one the corresponding bit in the status byte is cleared to zero. Any bits in the status byte which are not selected are not modified.

Program Status Bits affected – F, II, SP

DECIMAL ADJUST REGISTER



Mnemonic – DAR,r

Addressing mode – register addressing

Execution time – 3 cycles (9 clock periods)

This one-byte instruction conditionally adds a decimal ten (two's complement negative six in a 4-bit binary number system) to either the high order 4 bits and/or the low order 4 bits of the specified register r.

The truth table below indicates the logical operation performed. The operation proceeds based on the contents of the Carry (CAR) and Interdigit Carry (IDC) bits in the Program Status Word. The CAR and IDC remain unchanged by the execution of this instruction.

This instruction allows BCD sign magnitude arithmetic to be performed on packed digits by the following procedure.

BCD Addition:

1) add 66_{16} to augend
2) perform addition of addend and augend
3) perform DAR instruction

BCD Subtraction:

1) perform subtraction (two's complement of subtrahend is added to the minuend)
2) perform DAR instruction

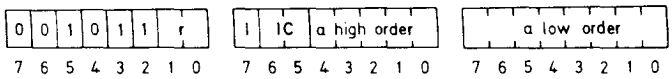
Since this operation is on sign-magnitude numbers, it is necessary to establish the sign of the result prior to executing in order to properly control the definition of the subtrahend and minuend.

Carry	Interdigit Carry	Added to Register r
0	0	AA_{16}
0	1	AO_{16}
1	1	OO_{16}
1	0	OA_{16}

Program Status Bits affected – CC

Condition Code setting – the Condition Code is set to a meaningless value

EXCLUSIVE-OR ABSOLUTE



Mnemonic – EORA,r (*) a (,X)

Addressing mode – Absolute addressing; indirect and/or indexed addressing may be specified

Execution time – 4 cycles (12 clock periods)

This three-byte instruction causes the contents of register r to be Exclusive-ORed with the contents of the memory byte pointed to by the 13-bit address. The result of the operation replaces the previous contents of register r.

If indexing is specified, bits 1 and 0, byte 0, indicate the index register and the destination of the operation implicitly becomes Register Zero.

The Exclusive-OR operation treats each bit of the argument bytes as in the truth table below.

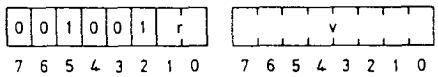
Bit (0 to 7)	Bit (0 to 7)	Exclusive-OR result
0	0	0
0	1	1
1	0	1
1	1	0

Program Status Bits affected – CC

Condition Code setting

Register r	CC1	CC0
Positive	0	1
Zero	0	0
Negative	1	0

EXCLUSIVE-OR IMMEDIATE



Mnemonic – EORI,r v

Addressing mode – immediate addressing

Execution time – 2 cycles (6 clock periods)

This two-byte instruction causes the contents of the specified register r to be logically Exclusive-ORed with the contents of the second byte of this instruction. The result of this operation replaces the previous contents of register r.

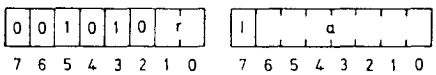
The Exclusive-OR operation treats each bit of the argument bytes as in the truth table shown for the EORA instruction.

Program Status Bits affected – CC

Condition Code setting

Register r	CC1	CC0
Positive	0	1
Zero	0	0
Negative	1	0

EXCLUSIVE-OR RELATIVE



Mnemonic – EORR,r (*) a

Addressing mode – relative addressing; indirect addressing may be specified

Execution time – 3 cycles (9 clock periods)

This two-byte instruction causes the contents of the specified register r to be logically Exclusive-ORed with the contents of the memory byte pointed to by the effective address. The result of this operation replaces the previous contents of register r.

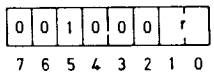
The Exclusive-OR operation treats each bit of the argument bytes as in the truth table shown for the EORA instruction.

Program Status Bits affected – CC

Condition Code setting

Register Zero	CC1	CC0
Positive	0	1
Zero	0	0
Negative	1	0

EXCLUSIVE-OR WITH REGISTER ZERO



Mnemonic – EORZ r

Addressing mode – register addressing

Execution time – 2 cycles (6 clock periods)

This one-byte instruction causes the contents of the specified register r to be logically Exclusive-ORed with the contents of Register Zero. The result of this operation replaces the contents of Register Zero. The contents of register r remain unchanged.

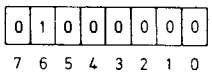
The Exclusive-OR operation treats each bit of the argument bytes as in the truth table shown for the EORA instruction.

Program Status Bits affected – CC

Condition Code setting

Register Zero	CC1	CC0
Positive	0	1
Zero	0	0
Negative	1	0

HALT, ENTER WAIT STATE



Mnemonic – HALT

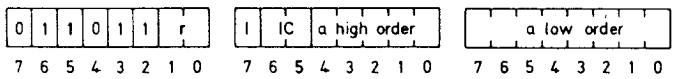
Execution time – 2 cycles (6 clock periods)

This one-byte instruction causes the processor to stop executing instructions and enter the WAIT state. The RUN/$\overline{\text{WAIT}}$ line is set to the WAIT state.

The only way to enter the RUN state after a HALT has been executed is to reset the 2650 or to interrupt the processor.

Program Status Bits affected – none

INCLUSIVE-OR ABSOLUTE



Mnemonic – IORA,r (*) a (,X)

Addressing mode – absolute addressing; indirect and/or indexed addressing may be specified

Execution time – 4 cycles (12 clock periods)

This three-byte instruction causes the contents of register r to be logically Inclusive-ORed with the contents of the memory byte pointed to by the 13-bit address. The result of the operation replaces the previous contents of register r.

If indexing is specified, bits 1 and 0, byte 0, indicate the index register and the destination of the operation implicitly becomes Register Zero.

The Inclusive-OR operation treats each bit of the argument bytes as in the truth table below.

Bit (0 to 7)	Bit (0 to 7)	Inclusive-OR result
0	0	0
0	1	1
1	0	1
1	1	1

Program Status Bits affected – CC

Condition Code setting

Register Zero	CC1	CC0
Positive	0	1
Zero	0	0
Negative	1	0

INCLUSIVE-OR IMMEDIATE

Mnemonic – IORI,r v

Addressing mode – immediate addressing

Execution time – 2 cycles (6 clock periods)

This two-byte instruction causes the contents of the specified register r to be logically Inclusive-ORed with the contents of the second byte of this instruction. The result of this operation replaces the contents of register r.

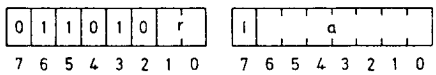
The Inclusive-OR operation treats each bit of the argument bytes as in the truth table shown for the IORA instruction.

Program Status Bits affected – CC

Condition Code setting

Register r	CC1	CC0
Positive	0	1
Zero	0	0
Negative	1	0

INCLUSIVE-OR RELATIVE



Mnemonic – IORR,r (*) a

Addressing mode – relative addressing; indirect addressing may be specified

Execution time – 3 cycles (9 clock periods)

This two-byte instruction causes the contents of the specified register r to be logically Inclusive-ORed with the contents of the memory byte pointed to by the effective address. The result of this operation replaces the previous contents of register r.

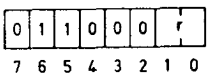
The Inclusive-OR operation treats each bit of the argument byte as in the truth table shown for the IORA instruction.

Program Status Bits affected – CC

Condition Code setting

Register r	CC1	CC0
Positive	0	1
Zero	0	0
Negative	1	0

INCLUSIVE-OR WITH REGISTER ZERO



Mnemonic – IORZ r

Addressing mode – register addressing

Execution time – 2 cycles (6 clock periods)

This one-byte instruction causes the contents of the specified register r to be logically Inclusive-ORed with the contents of Register Zero. The result of this operation replaces the contents of Register Zero. The contents of register r remain unchanged.

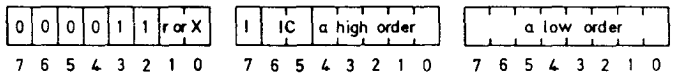
The Inclusive-OR operation treats each bit of the argument bytes as in the truth table shown for the IORA instruction.

Program Status Bits affected – CC

Condition Code setting

Register Zero	CC1	CC0
Positive	0	1
Zero	0	0
Negative	1	0

LOAD ABSOLUTE



Mnemonic – LODA,r (*) a (,X)

Addressing mode – absolute addressing; indirect and/or indexed addressing may be specified

Execution time – 4 cycles (12 clock periods)

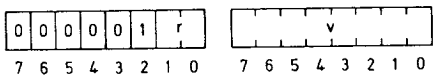
This three-byte instruction transfers a byte of data from memory into the specified register r. The data byte is found at the effective address. If indexing is specified, bits 1 and 0, byte 0, indicate the index register and the destination of the operation implicitly becomes Register Zero. The previous contents of register r are lost.

Program Status Bits affected – CC

Condition Code setting

Register r	CC1	CC0
Positive	0	1
Zero	0	0
Negative	1	0

LOAD IMMEDIATE



Mnemonic – LODI,r v

Addressing mode – immediate addressing

Execution time – 2 cycles (6 clock periods)

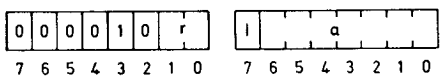
This two-byte instruction transfers the second byte of the instruction v into the specified register r. The previous contents of register r are lost.

Program Status Bits affected – CC

Condition Code setting

Register r	CC1	CC0
Positive	0	1
Zero	0	0
Negative	1	0

LOAD RELATIVE



Mnemonic – LODR,r (*) a

Addressing mode – relative addressing; indirect addressing may be specified

Execution time – 3 cycles (9 clock periods)

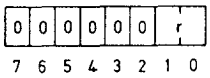
This two-byte instruction transfers a byte of data from memory into the specified register r. The data byte is found at the effective address formed by the addition of the a field and the address of the byte following this instruction. The previous contents of register r are lost.

Program Status Bits affected – CC

Condition Code setting

Register r	CC1	CC0
Positive	0	1
Zero	0	0
Negative	1	0

LOAD TO REGISTER ZERO



Mnemonic – LODZ r

Addressing mode – register addressing

Execution time – 2 cycles (6 clock periods)

This one-byte instruction transfers the contents of the specified register r into Register Zero. The previous contents of Register Zero are lost. The contents of register r remain unchanged.

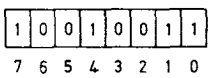
Note: When the specified register r equals 0, the operation code is changed to 60_{16} (IORZ 0) by the assembler. The instruction, 00000000, yields indeterminate results.

Program Status Bits affected – CC

Condition Code setting

Register Zero	CC1	CC0
Positive	0	1
Zero	0	0
Negative	1	0

LOAD PROGRAM STATUS LOWER



Mnemonic – LPSL

Execution time – 2 cycles (6 clock periods)

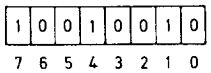
This one-byte instruction causes the current contents of the Lower Program Status byte to be replaced with the contents of Register Zero.

See Program Status Word description for bit assignments.

Program Status Bits affected – CC, IDC, RS, WC, OVF, COM, CAR

Condition Code setting – the CC will take on the value in bits 7 and 6 of Register Zero

LOAD PROGRAM STATUS UPPER



Mnemonic – LPSU

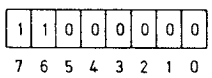
Execution time – 2 cycles (6 clock periods)

This one-byte instruction causes the current contents of the Upper Program Status byte to be replaced with the contents of Register Zero.

See Program Status Word description for bit assignments. Bits 4 and 3 of the PSU are unassigned and will always be regarded as containing zeros.

Program Status Bits affected – F, II, SP

NO OPERATION



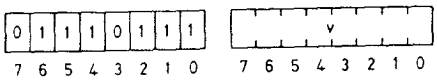
Mnemonic – NOP

Execution time – 2 cycles (6 clock periods)

This one-byte instruction causes the processor to take no action upon decoding it. No registers are changed, but fetching and executing a NOP instruction requires two processor cycles.

Program Status Bits affected – none

PRESET PROGRAM STATUS LOWER, SELECTIVE



Mnemonic – PPSL v

Addressing mode – immediate addressing

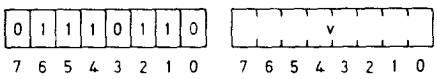
Execution time – 3 cycles (9 clock periods)

This two-byte instruction causes individual bits in the Lower Program Status byte to be selectively set to one. When this instruction is executed, each bit in the v field of the second byte of this instruction is tested for the presence of a one, and if a particular bit in the v field contains a one, the corresponding bit in the status byte is set to one. Any bits in the status byte which are not selected are not modified.

Program Status Bits affected – CC, IDC, RS, WC, OVF, COM, CAR

Condition Code setting – the CC bits may be set by the execution of this instruction

PRESET PROGRAM STATUS UPPER, SELECTIVE



Mnemonic – PPSU v

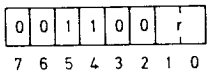
Addressing mode – immediate addressing

Execution time – 3 cycles (9 clock periods)

This two-byte instruction causes individual bits in the Upper Program Status byte to be selectively set to one. When this instruction is executed, each bit in the v field of the second byte of the instruction is tested for the presence of a one, and if a particular bit in the v field contains a one, the corresponding bit in the status byte is set to one. Any bits in the status byte which are not selected are not modified.

Program Status Bits affected – F, II, SP

READ CONTROL (PORT C)



Mnemonic – REDC,r

Addressing mode – register addressing

Execution time – 2 cycles (6 clock periods)

This one-byte input instruction causes a byte of data to be transferred from the data bus into register r. Signals on the data bus are considered to be true signals, that is a high level will be set into the register as a one.

When executing this instruction, the processor raises the Operation Request (OPREQ) line, and switches the M/$\overline{IO}$ line to IO, and the $\overline{R}$/W line to R (Read). Also during the OPREQ signal, the D/$\overline{C}$ line switches to C (Control), and the E/$\overline{NE}$ line to NE (Non-extended).

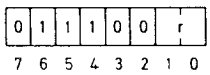
See Ref.6 for further details of hardware signals for the 2650.

Program Status Bits affected – CC

Condition Code setting

Register r	CC1	CC0
Positive	0	1
Zero	0	0
Negative	1	0

READ DATA (PORT D)



Mnemonic – REDD,r

Addressing mode – register addressing

Execution time – 2 cycles (6 clock periods)

This one-byte input instruction causes a byte of data to be transferred from the data bus into register r. Signals on the data bus are considered to be true signals, that is a high level will be set into the register as a one.

When executing this instruction, the processor raises the Operation Request (OPREQ) line, and switches the M/$\overline{IO}$ line to IO, and the $\overline{R}$/W to R (Read). Also during the OPREQ signal, the D/$\overline{C}$ line switches to D (Data) and the E/$\overline{NE}$ line to NE (Non-extended).

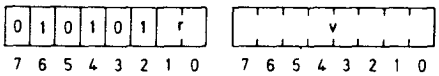
See Ref.6 as for REDC.

Program Status Bits affected – CC

Condition Code setting

Register r	CC1	CC0
Positive	0	1
Zero	0	0
Negative	1	0

READ EXTENDED



Mnemonic – REDE,r

Addressing mode – immediate addressing

Execution time – 3 cycles (9 clock periods)

This two-byte input instruction causes a byte of data to be transferred from the data bus into register r. During the execution of this instruction, the content of the second byte of the instruction is made available on the address bus. Signals on the data bus are true signals, that is a high level is interpreted as a one.

During execution, the processor raises the Operation Request (OPREQ) line, and places the contents of the second byte of the instruction on the address bus; the M/$\overline{IO}$ line is switched to IO, and the $\overline{R}$/W line to R (Read). During the OPREQ signal, the E/$\overline{NE}$ line is switched to E (Extended).

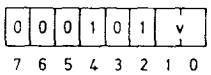
See Ref.6 as for REDC.

Program Status Bits affected – CC

Condition Code setting

Register r	CC1	CC0
Positive	0	1
Zero	0	0
Negative	1	0

RETURN FROM SUBROUTINE, CONDITIONAL



Mnemonic – RETC,v

Execution time – 3 cycles (9 clock periods)

This one-byte instruction is used by a subroutine to conditionally effect a return of control to the program which last issued a subroutine branch instruction.

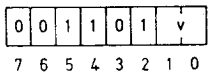
If the 2-bit v field in the instruction matches the Condition Code field (CC) in the Program Status Word, the address contained in the top of the Return Address Stack replaces the previous contents of the Instruction Address Register (IAR), and the Stack Pointer is decremented by one.

If the v field does not match CC, the return is not affected and the next instruction to be executed is taken from the location following this instruction.

Note: If v is specified as 3_{16}, the return is executed unconditionally.

Program Status Bits affected – SP

RETURN FROM SUBROUTINE AND ENABLE INTERRUPT, CONDITIONAL



Mnemonic – RETE,v

Execution time – 3 cycles (9 clock periods)

This one-byte instruction is used by a subroutine to conditionally effect a return of control to the program which last issued a subroutine branch instruction. Additionally, if the return is effected, the Interrupt Inhibit (II) bit in the Program Status Word is cleared to zero, thus enabling interrupts. This instruction is mainly intended to be used by an interrupt handling routine because an interrupt causes a subroutine branch to be effected and the Interrupt Inhibit bit to be set to '1'. The interrupt handling routine must be able to return and enable simultaneously so that the interrupt routine itself cannot be interrupted unless that is specifically desired.

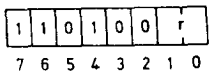
If the 2-bit v field in the instruction matches the Condition Code field (CC) in the Program Status Word, the address contained in the top of the Return Address Stack (RAS) replaces the previous contents of the Instruction Address Register (IAR), the Stack Pointer is decremented by one, and the II bit is cleared to zero.

If the v field does not match CC, the return is not effected and the next instruction to be executed is taken from the location following this instruction.

Note: If v is specified as 3_{16}, the return is executed unconditionally.

Program Status Bits affected – SP, II

ROTATE REGISTER LEFT



Mnemonic – RRL,r

Addressing mode – register addressing

Execution time – 2 cycles (6 clock periods)

This one-byte instruction causes the contents of the specified register r to be shifted left one bit. If the WC bit in the Program Status Word is set to zero, bit 7 of register r flows into bit 0; if WC is set to one, then bit 7 flows into the Carry bit and the Carry bit flows into bit 0. This is shown in Fig.13.

Register bit 4 flows into the IDC if WC = 1.

Note: Whenever a rotate causes bit 7 of the specified register to change from '0' to '1' and WC = 1, the OVF bit in the PSL is set.

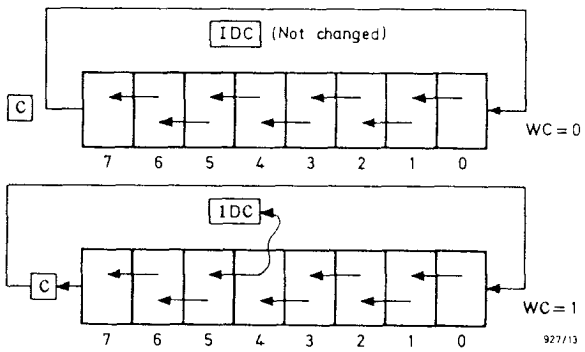


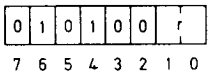
Fig.13 – Operation of the ROTATE REGISTER LEFT (RRL) instruction

Program Status Bits affected – CAR, CC, IDC, OVF

Condition Code setting

Register r	CC1	CC0
Positive	0	1
Zero	0	0
Negative	1	0

ROTATE REGISTER RIGHT



Mnemonic – RRR,r

Addressing mode – register addressing

Execution time – 2 cycles (6 clock periods)

This one-byte instruction causes the contents of the specified register r to be shifted right one bit. If the WC bit in the Program Status Word is set to zero, bit 0 of the register r flows into bit 7; if WC is set to one, then bit 0 flows into the Carry bit and the Carry bit flows into bit 7. This is shown in Fig.14.

Register bit 6 flows into the IDC if WC = 1.

Note: Whenever a rotate causes bit 7 of the specified register to change from '0' to '1' and WC = 1, the OVF bit in the PSL is set.

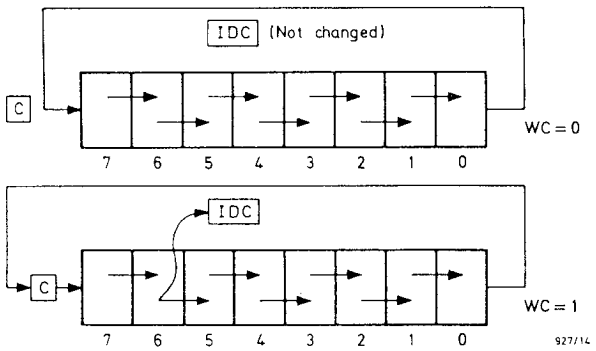


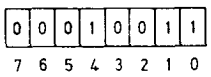
Fig.14 – Operation of the ROTATE REGISTER RIGHT (RRR) instruction

Program Status Bits affected – CAR, CC, IDC, OVF

Condition Code setting

Register r	CC1	CC0
Positive	0	1
Zero	0	0
Negative	1	0

STORE PROGRAM STATUS LOWER



Mnemonic – SPSL

Execution time – 2 cycles (6 clock periods)

This one-byte instruction causes the contents of the Lower Program Status byte to be transferred into Register Zero.

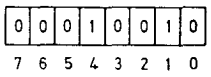
See Program Status Word description for bit assignments.

Program Status Bits affected – CC

Condition Code setting

Register Zero	CC1	CC0
Positive	0	1
Zero	0	0
Negative	1	0

STORE PROGRAM STATUS UPPER



Mnemonic – SPSU

Execution time – 2 cycles (6 clock periods)

This one-byte instruction causes the contents of the Upper Program Status byte to be transferred into Register Zero.

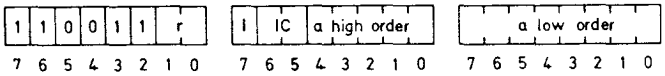
See Program Status Word description for bit assignments. Bits 4 and 3, which are unassigned, will always be stored as zeros.

Program Status Bits affected – CC

Condition Code setting

Register Zero	CC1	CC0
Positive	0	1
Zero	0	0
Negative	1	0

STORE ABSOLUTE



Mnemonic – STRA,r (*) a (,X)

Addressing mode – absolute addressing; indirect and/or indexed addressing may be specified

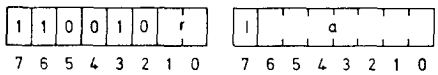
Execution time – 4 cycles (12 clock periods)

This three-byte instruction transfers a byte of data from the specified register r into the byte of memory pointed to by the effective address. The contents of register r remain unchanged, and the contents of the memory byte are replaced.

If indexing is specified, bits 1 and 0, byte 0, indicate the index register, and the source of data for the operation implicitly becomes Register Zero.

Program Status Bits affected – none

STORE RELATIVE



Mnemonic – STRR,r (*) a

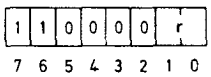
Addressing mode – relative addressing; indirect addressing may be specified

Execution time – 3 cycles (9 clock periods)

This two-byte instruction transfers a byte of data from the specified register r into the byte of memory pointed to by the effective address. The contents of register r remain unchanged, and the contents of the memory byte are replaced.

Program Status Bits affected – none

STORE REGISTER ZERO



Mnemonic – STRZ r where r ≠ 0

Addressing mode – register addressing

Execution time – 2 cycles (6 clock periods)

This one-byte instruction transfers the contents of Register Zero into the specified register r. The previous contents of register r are lost. The contents of Register Zero remain unchanged.

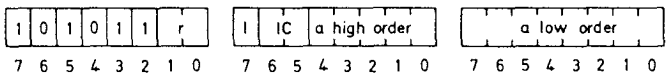
Note: Register r may not be specified as zero; this operation code, '11000000', is reserved for NOP. If this is attempted, Prometheus will indicate a syntax error.

Program Status Bits affected – CC

Condition Code setting

Register r	CC1	CC0
Positive	0	1
Zero	0	0
Negative	1	0

SUBTRACT ABSOLUTE



Mnemonic – SUBA,r (*) a (,X)

Addressing mode – absolute addressing; indirect and/or indexed addressing may be specified

Execution time – 4 cycles (12 clock periods)

This three-byte instruction causes the contents of the byte of memory pointed to by the effective address to be subtracted from the contents of register r. The result of the subtraction replaces the contents of register r.

The subtraction is performed by taking the binary two's complement of the contents of the memory byte, and adding that result to the contents of register r.

If indexing is specified, bits 1 and 0, byte 0, indicate the index register, and the destination of the operation implicitly becomes Register Zero.

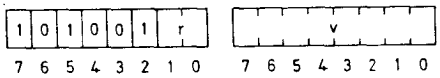
Note: Subtract with Borrow may be effected.

Program Status Bits affected – CAR, CC, IDC, OVF

Condition Code setting

Register r	CC1	CC0
Positive	0	1
Zero	0	0
Negative	1	0

SUBTRACT IMMEDIATE



Mnemonic – SUBI,r v

Addressing mode – immediate addressing

Execution time – 2 cycles (6 clock periods)

This two-byte instruction causes the contents of the second byte of this instruction to be subtracted from the contents of register r. The result of the subtraction replaces the contents of register r.

The subtraction is performed by taking the binary two's complement of the contents of the second instruction byte, and adding that result to the contents of register r.

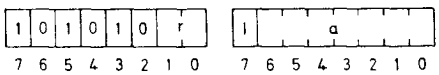
Note: Subtract with Borrow may be effected.

Program Status Bits affected – CAR, CC, IDC, OVF

Condition Code setting

Register r	CC1	CC0
Positive	0	1
Zero	0	0
Negative	1	0

SUBTRACT RELATIVE



Mnemonic – SUBR,r (*) a

Addressing mode – relative addressing; indirect addressing may be specified

Execution time – 3 cycles (9 clock periods)

This two-byte instruction causes the contents of the byte of memory pointed to by the effective address to be subtracted from the contents of register r. The result of the subtraction replaces the contents of register r.

The subtraction is performed by taking the binary two's complement of the contents of the byte of memory, and adding that result to the contents of register r.

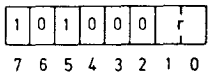
Note: Subtract with Borrow may be effected.

Program Status Bits affected – CAR, CC, IDC, OVF

Condition Code setting

Register r	CC1	CC0
Positive	0	1
Zero	0	0
Negative	1	0

SUBTRACT FROM REGISTER ZERO



Mnemonic – SUBZ r

Addressing mode – register addressing

Execution time – 2 cycles (6 clock periods)

This one-byte instruction causes the contents of the specified register r to be subtracted from the contents of Register Zero. The result of the subtraction replaces the contents of Register Zero. The contents of register r remain unchanged.

The subtraction is performed by taking the binary two's complement of the contents of register r, and adding that result to the contents of Register Zero.

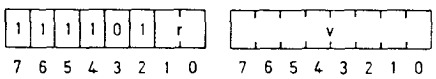
Note: Subtract with Borrow may be effected.

Program Status Bits affected – CAR, CC, IDC, OVF

Condition Code setting

Register Zero	CC1	CC0
Positive	0	1
Zero	0	0
Negative	1	0

TEST UNDER MASK, IMMEDIATE



Mnemonic – TMI,r v

Addressing mode – immediate addressing

Execution time – 3 cycles (9 clock periods)

This two-byte instruction tests individual bits in the specified register r to determine if they are set to one. During execution, each bit in the v field of the instruction is tested for a one, and if a particular bit in the v field contains a one, the corresponding bit in register r is tested for a one or zero. The condition code is set to reflect the result of the operation.

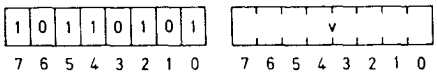
If a bit in the v field is zero, the corresponding bit in register r is not tested.

Program Status Bits affected – CC

Condition Code setting

	CC1	CC0
All the selected bits are '1's	0	0
Not all the selected bits are '1's	1	0

TEST PROGRAM STATUS LOWER, SELECTIVE



Mnemonic – TPSL v

Addressing mode – immediate addressing

Execution time – 3 cycles (9 clock periods)

This two-byte instruction tests individual bits in the Lower Program Status byte to determine if they are set to one. When this instruction is executed, each bit in the v field of the instruction is tested for a one, and if a particular bit in the v field contains a one, the corresponding bit in the status byte is tested for a one or zero. The Condition Code is set to reflect the result of this operation.

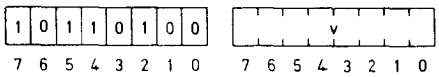
If a bit in the v field is zero, the corresponding bit in the status byte is not tested.

Program Status Bits affected – CC

Condition Code setting

	CC1	CC0
All the selected bits in PSL are '1's	0	0
Not all the selected bits in PSL are '1's	1	0

TEST PROGRAM STATUS UPPER, SELECTIVE



Mnemonic TPSU v

Addressing mode – immediate addressing

Execution time – 3 cycles (9 clock periods)

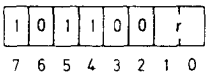
This two-byte instruction tests individual bits in the Upper Program Status byte to determine if they are set to one. When this instruction is executed, each bit in the v field of this instruction is tested for the presence of a one, and if a particular bit in the v field contains a one, the corresponding bit in the status byte is tested for a one or zero. The Condition Code is set to reflect the result of this operation.

If a bit in the v field is zero, the corresponding bit in the status byte is not tested.

Program Status Bits affected – CC

	CC1	CC0
All the selected bits in PSU are '1's	0	0
Not all the selected bits in PSU are '1's	1	0

WRITE CONTROL (PORT C)



Mnemonic – WRTC,r

Addressing mode – register addressing

Execution time – 2 cycles (6 clock periods)

This one-byte output instruction causes a byte of data to be made available to an external device.

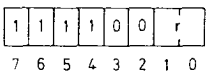
The byte to be output is taken from register r and made available on the data bus. Signals on the data bus are true signals, that is high level is interpreted as a one.

When executing this instruction, the processor raises the Operation Request (OPREQ) line and places the data on the Data Bus, the M/$\overline{IO}$ line is switched to IO, the $\overline{R}$/W line is switched to W (Write), and a Write Pulse (WRP) is generated. During OPREQ, the D/$\overline{C}$ line is switched to C (Control) and the E/$\overline{NE}$ line switched to NE(Non-extended).

See Ref.6 for further details of hardware signals for the 2650.

Program Status Bits affected – none

WRITE DATA (PORT D)



Mnemonic – WRTD,r

Addressing mode – register addressing

Execution time – 2 cycles (6 clock periods)

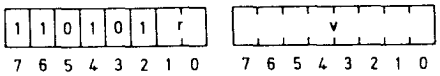
This one-byte output instruction causes a byte of data to be made available to an external device. The byte to be output is taken from register r and made available on the data bus. Signals on the data bus are true signals, that is a high level is interpreted as a one.

When executing this instruction, the processor raises the Operation Request (OPREQ) line and places the data on the Data Bus, the M/$\overline{IO}$ line is switched to IO, the $\overline{R}$/W line is switched to W (Write), and a Write Pulse (WRP) is generated. During OPREQ, the D/$\overline{C}$ line is switched to D (Data) and the E/$\overline{NE}$ line is switched to NE (Non-extended).

See Ref.6 as for WRTC.

Program Status Bits affected – none

WRITE EXTENDED



Mnemonic – WRTE,r v

Addressing mode – immediate addressing

Execution time – 3 cycles (9 clock periods)

This two-byte output instruction causes a byte of data to be made available to an external device. The byte to be output is taken from register r and is made available on the data bus. The data in the second byte of this instruction is made available on the address but. The second byte v may be interpreted as a device address.

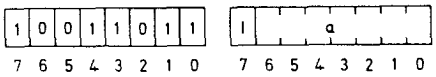
Signals on the buses are true levels, that is a high level is interpreted as a one.

When executing this instruction, the processor raises the Operation Request (OPREQ) line and places the data from register r on the data bus and the data from the second byte of the instruction on the address bus; the M/$\overline{IO}$ line is switched to IO, the $\overline{R}$/W line is switched to W (Write), and a Write Pulse (WRP) is generated. During OPREQ, the E/$\overline{NE}$ line is switched to E (Extended).

See Ref.6 as for WRTC.

Program Status Bits affected – none

ZERO BRANCH, RELATIVE



Mnemonic – ZBRR (*) a

Addressing mode – relative addressing; indirect addressing may be specified

Execution time – 3 cycles (9 clock periods)

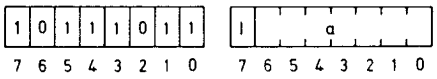
This two-byte unconditional relative branch instruction directs the processor to calculate the effective address in a manner different from the usual calculation for the Relative Addressing mode.

The specified value a is interpreted as a relative displacement from page zero, byte zero. Therefore, displacement may be specified from –64 to +63 bytes. The address calculation is modulo 8192_{10}, so the negative displacement will develop addresses at the end of page zero. For example, ZBRR –8, will develop an effective address of 8184_{10}, and a ZBRR +52 will develop an effective address of 52_{10}.

This instruction causes the processor to clear the page address bits, bits 13 and 14, and to replace the contents of the Instruction Address Register with the effective address of the instruction. This instruction may be executed anywhere within addressable memory.

Program Status Bits affected – none

ZERO BRANCH TO SUBROUTINE, RELATIVE



Mnemonic – ZBSR (*) a

Addressing mode – relative addressing; indirect addressing may be specified

Execution time – 3 cycles (9 clock periods)

This two-byte unconditional subroutine branch instruction directs the processor to calculate the effective address in a manner different from the usual calculation for the Relative Addressing mode.

The specified value a is interpreted as a relative displacement from page zero, byte zero. Therefore, displacement may be specified from −64 to +63 bytes. The address calculation is modulo 8192_{10}, so the negative displacement will develop addresses at the end of page zero. For example, ZBSR −10, will develop an effective address of 8182_{10}, and ZBSR 31 will develop an effective address of 31_{10}.

This instruction causes the processor to clear the page bits, address bits 14 and 13, and may be executed anywhere within addressable memory.

When executed, this instruction causes the Stack Pointer to be incremented by one, the address of the byte following this instruction is pushed into the Return Address Stack (RAS), and control is transferred to the effective address.

Program Status Bits affected – SP

INFORMATION SPECIFICATION IN PROCESSOR INSTRUCTIONS

In the Addressing Modes section, the information required for the execution of a particular instruction was considered to be written in binary form (15 bits representing addresses, or '11' representing register 3 for example). This is often inconvenient however, and the 2650 assembly language offers various methods of simplifying this specification of information. These are detailed below.

Constants

When a constant with a fixed numerical value is to be used in a program statement, for example as the second byte of an immediate addressing instruction, it is usually an advantage if this constant can be written in some form more readable than an 8-bit binary number. The Prometheus assembler accepts five such forms.

Decimal constant

A decimal constant is the simplest form; any decimal number written in a statement is automatically translated to its corresponding binary value. Thus, in the instruction LODI,R3 42 the assembler will generate the binary number 00101010 to insert into the second byte of the instruction.

A decimal constant may be written as an optionally signed decimal number enclosed in single quotes and preceded by the letter D; for example D'42'. This form must be used with the DATA directive (see Assembler

Directives section) when more than one byte of decimal data is specified.

Hexadecimal constant
A hexedecimal constant is written as an optionally signed hexadecimal number enclosed in single quotes and preceded by the letter H; for example H'2A'. The corresponding binary value will be right justified.

Binary constant
A binary constant consists of an optionally signed binary number enclosed in single quotes and preceded by the letter B; for example B'00101010'. This information will be stored right justified.

Octal constant
An octal constant is written as an optionally signed octal number enclosed in single quotes and preceded by the letter O; for example O'52'. The corresponding value will be right justified.

ASCII character constant
An ASCII character constant consists of a string of up to 16 ASCII characters enclosed in single quotes and preceded by the latter A; for example A'PROMETHEUS'. Each character will be encoded in 7-bit ASCII code and stored in successive bytes. The high-order bit in each allocated byte is set to zero.

Multiple constant specification
All the constant forms except the A form allow multiple specification; for example H'03,–F2,+11,33,0'. This format is used with the DATA directive (see Assembler Directives section).

A comma separates each byte specification; only 16 bytes may be included in one multiple constant.

Symbols
The use of symbolic names as statement labels has already been discussed, but such names can also be used to replace binary values in the operation and operand fields. Symbols used in this way must obey the same restrictions as labels to be considered valid, and may be used to represent memory addresses, constants, logic masks, or registers.

When a symbol is used, it must be defined; that is, the assembler must associate the symbol with a particular numerical or logical value. This is done by using the EQU assembler directive (see Assembler Directives section) if the symbol is to represent a constant or a logic mask; it is automatically done when the symbol appears as a label, as the assembler assigns the address of the first byte of the operation field to the symbol. The number of definitions required is reduced by the predefinition of 20 common symbols by the Prometheus program. These 20 symbols may be used without definition by the programmer; they are listed below, and their assigned values given.

Register numbers	R0	EQU	0
	R1	EQU	1
	R2	EQU	2
	R3	EQU	3
Condition Code settings for conditional branch comparison	Z	EQU	B'00'
	P	EQU	B'01'
	N	EQU	B'10'
	EQ	EQU	B'00'
	GT	EQU	B'01'
	LT	EQU	B'10'
Condition Code setting for unconditional branches	UN	EQU	B'11'
Program Status Lower bit designations	IDC	EQU	H'20'
	RS	EQU	H'10'
	WC	EQU	H'08'
	OVF	EQU	H'04'
	COM	EQU	H'02'
	CAR	EQU	H'01'
Program Status Upper bit designations	SENS	EQU	H'80'
	FLAG	EQU	H'40'
	II	EQU	H'20'

These symbols will be found useful in any program, the first four for easily identifiable register specification; the next seven for testing the Condition Code in the PSW, mainly for branch operations; and the remaining nine for selectively setting and clearing bits in the PSW. The use of the symbols should become clear with reference to the sections on the PSW and the Instruction Set.

Special symbols
Several characters in the Prometheus assembler character set have special meanings to the assembler program; these are described below.

+ – Auto increment indicator for indexed addressing instructions (see Addressing Modes). This symbol is written after the index register specification of such an instruction, separated from it by a comma (see Instruction Set). This sets the index control bits to '0' and '1'.

– – Auto decrement indicator. This symbol is used in the same way as for auto increment, but sets the index control bits to '1' and '0'.

$ – Location counter. This symbol is always equated to the address of the first byte of the current instruction. This can be used as the argument of a branch instruction in delay routines (see Ref.7) or for a branch to a location a known number of bytes from the current instruction, by branching to $+5 or $–6 for example.

* – Indirect address indicator/comment line indicator. This symbol has two meanings, depending on its position in a statement. If it is in logical column 1, it means that the whole statement line is comment and should merely be reproduced; if it appears as the first character of the argument field, it indicates an indirect addressing cycle (see Addressing Modes).

< – Modulo 256 divide indicator. This operator must appear as the first character of the operand field if used, and indicates that only the high-order 8 bits are to be used.

> – Modulo 256 multiply indicator. This operator is used in the same way as <, but indicates that the low-order 8 bits are to be used.

Note: As an example of the use of the < and > operators, a situation may arise in which it is desired to load the high-order byte of an address, ADDR, into Register Two and the low-order byte into Register One. This may be achieved by writing:

```
LODI,R2   <ADDR
LODI,R1   >ADDR
```

Using these operators can save bytes and so shorten running time.

Expressions

An expression is a combination of terms separated by the arithmetic operators '+' and '–', which in this context are not taken as index control specifications. These terms may be symbolic names, constants, or the location counter ($), and each term must be containable in 15 bits plus a sign bit. The complete expression may be considered as up to 16 bits unsigned if this is easier to envisage; however, when used as an address the limitation on the value of an expression is the addressing capacity of the processor (15 bits, 32 768 locations).

ASSEMBLER DIRECTIVES

There are twelve directives which are instructions to the assembler itself and have no meaning to the processor, although similar in format to processor instructions. They direct the assembler to perform specific tasks during the assembly process; details of their operation are given below.

ACON – Define address constant

Label	Operation	Operand
(name)	ACON	expression

This directive instructs the assembler to allocate two successive bytes of storage, and is written in the format shown above, where:

name is an optional label, which if specified becomes the symbolic address of the first allocated byte;

expression is some expression which resolves to a value which can be contained in two bytes.

The ACON directive is mainly intended to provide two bytes containing a 15-bit address.

DATA – Define memory data

Label	Operation	Operand
(name)	DATA	expression

This directive instructs the assembler to allocate the exact number of storage bytes required to hold the data specified in the operand field of the directive, and has the format shown above, where:

name is an optional label, which is specified becomes the symbolic address of the first allocated byte;

expression is a numerical constant, a symbolic address, or a multiple constant specification. Any expression that can be resolved to a single value causes one byte to be allocated, and if the resolved value cannot be contained in one byte an error will be indicated by the assembler. If a multiple constant specification is used, the DATA directive allocates a number of bytes corresponding to the number of elements in the multiple constant. If more than sixteen elements are specified, an error will be indicated. A multiple constant specification is decoded only up to the second single quote; for example, in the statement DATA H'27',B'10' the ,B'10' part is ignored.

EJE – Eject the listing page

Label	Operation	Operand
	EJE	

This directive has the format shown, and instructs the assembler to advance the listing to the top of the next page, regardless of the line position on the current listing page. It is used to organise a listing for documentation purposes, and does not appear in the listing.

END – End assembly

Label	Operation	Operand
	END	expression

This directive has the form shown above, where:

expression may be resolved to the starting address of the program. If this parameter is unspecified, the start address is set to zero.

The END directive informs the assembler that the last statement to be assembled has been input and the assembler may proceed to the next pass; it also causes the assembler to communicate the program start address to the object module.

EQU – Specify symbol equivalence

Label	Operation	Operand
name	EQU	expression

The format of this directive is shown above, where:

name is a symbol which is to be assigned some value by the assembler, and every EQU directive used must have such a symbolic name in the label field;

expression may be resolved to zero or some integer value.

The EQU directive instructs the assembler to equate the symbol in the label field with the evaluatable expression in the operand field; whenever the symbol is used in the program after being assigned a value in this way, the symbol is replaced by the value of the expression.

LIBR – Library directive

Label	Operation	Operand
	LIBR	string

This directive has the form shown above, where:

string is a sequence of valid characters, excluding a colon (:) which would be regarded as a block start character on the object tape.

The LIBR directive enables several paper tapes to be combined, and the contents of these tapes assembled as if they were joined in one source tape. When the assembler reaches the LIBR directive, the string is printed out and the assembler pauses until any character is typed, after which the pass continues. In this pause, a new tape may be loaded into the reader and it will be assembled as an extension of the program on the preceding tape. This allows a program to be punched on a number of short tapes rather than one long one, thus reducing the problem of editing, and also allows the creation of 'libraries' of subroutines or programs.

If the printer or punch has been turned off by the PRT or PCH directives (see later), LIBR returns it to the ON state.

ORG – Set location counter

Label	Operation	Operand
(name)	ORG	expression

This directive has the form shown above, where:

name is an optional label which identifies the location specified by the expression;

expression resolves to a positive integer value which replaces the contents of the location counter. Bytes assembled after this directive will be assigned sequential addresses in memory, beginning with this value. Any symbols in the expression must be previously defined, or the assembler will subsequently indicate an error.

The ORG directive sets the location counter ($) to a specified value; if no ORG statement is used, the assembler assumes an ORG 0 at the beginning of the program.

PCH – Alter punch control

Label	Operation	Operand
	PCH	ON or OFF

This directive has the form shown above, and instructs the assembler to resume or discontinue punching out the object tape. It is primarily used to suppress parts of the object module. PCH is set to ON at the beginning of an assembly; if it is changed during a program, the PCH OFF will not appear in the listing. During pass 3, a PCH OFF directive will cause any outstanding bytes of the object module to be printed.

Only two characters of the ON or OFF will be decoded.

PRT – Alter printer control

Label	Operation	Operand
	PRT	ON or OFF

This directive has the form shown above, and operates in the same way as the PCH directive except that it controls the listing printer instead of the tape punch. Once again, a PRT ON is assumed at the start of an assembly, and a PRT OFF will not appear in the listing if the directive is used later in the program.

Only two characters of the ON or OFF will be decoded.

RES – Reserve memory storage

Label	Operation	Operand
(name)	RES	expression

This directive has the form shown above, where:

name is an optional label which, if used, becomes the symbolic address of the first byte allocated by the directive;

expression is some expression which may be resolved to a positive integer or zero.

The RES directive tells the assembler to reserve sequential bytes of memory, the number of which is defined by the value of the expression in the operand field; if this value is negative an error will result. The reserved bytes are not set to a known value but the location counter is incremented.

As for the PCH directive, any outstanding bytes of the object module will be punched as this instruction is executed.

SPC – Control spacing

Label	Operation	Operand
	SPC	expression

This directive has the form shown above, where:

expression is some expression which resolves to zero or a positive integer.

The SPC directive instructs the assembler to skip a number of lines in the listing print-out, the number being defined by the value of the expression in the operand field; if this value is greater than may be contained in one byte, an error will be indicated. If this number is greater than the number of lines remaining on the listing page, the effect is the same as the EJE directive. An SPC directive is used to organise listings, and does not appear in the listing.

TITL – Title

Label	Operation	Operand
	TITL	string

This directive has the form shown above, where:

string is a string of valid characters, up to 40 characters in length.

The TITL directive instructs the assembly to skip to the top of the next listing page and insert a given title as a heading; the title information is given in the string in the operand field. This directive does not appear in the listing. The title will appear at the top of each subsequent page unless and until a new TITL directive is used.

Producing a source tape

PRODUCING A SOURCE TAPE

When a program has been written in 2650 assembly language, it must be transferred onto paper tape before being input to Prometheus. The Prometheus program accepts standard 7-bit ASCII coded characters, and requires any parity bits to be removed or set to zero. This is automatically done if the teletype tape reader is used to read the source tape, but if a fast tape reader is used the control routine for the reader must remove the parity bit.

The program should be punched out exactly as it is written, including spaces between fields and a RETURN followed by a LINE FEED at the end of each program statement; typing the LINE FEED before the RETURN may cause errors. A maximum of 72 characters is allowed in any statement. This process is simple for any user with slight knowledge of the teletype or typewriter keyboard; for this reason, this section will be confined to methods of correcting any punching errors which may occur. These methods are set out below.

Cancelling a mis-punched character

If the error is spotted immediately, the incorrect character may be cancelled by punching a back-arrow (←) followed by the correct character. The assembler ignores any character followed by a back-arrow. No spaces should be punched between the three characters.

Examples:

EOQ←RZ R2 will be taken as EORZ R2

LOQZ←←DZ R1 will be taken as LODZ R1.

Cancelling an entire line

(before the carriage return has been punched)

Punching CONTROL + X (holding down the CONTROL key and typing an X), followed by a carriage return means that the entire line of the program up to and including the CONTROL + X character is ignored by the assembler.

Inserting an entire line

This is achieved by using the tape reader and tape punch of the teletype together. The tape containing the program to be modified is loaded into the reader at the start of the program, the punch switched on, and the reader started. The tape being read in is then reproduced by the punch. The reader is stopped just before the point at which the line is to be inserted, and the single-step reader control button used to advance the tape until the final character of the line preceding the insertion has been copied. The new line is then punched out in the usual way, including the final carriage return and the line feed characters, and then the reader started again to copy the remainder of the program tape. This process may be repeated as many times as necessary, if several lines are to be inserted, by stopping the copying process at the appropriate points.

Deleting an entire line

This may be achieved by following the sequence of operations given for inserting a new line, except that instead of typing a new line before the reader is restarted, the single-step control is used to advance the tape through the reader with the punch turned off, until the line to be deleted has passed completely through the reader. The punch is then switched on, and the reader restarted; the line bypassed in this way will not be reproduced by the punch.

Assembling a program

ASSEMBLING A PROGRAM

Once a source tape containing the assembly language program has been punched, and any punching errors corrected, the assembly by Prometheus may be started; the procedure is detailed below.

1) Load the tape into the reader of the teletype (or the tape reader if one is available) at the start of the program.
2) Set the PAUSE switch on the DS2000 base (see Ref.3) to 'RUN' and press the RESET button, this clears the program counter in the 2650 on the prototyping board to zero. If the assembler and prototyping board are to be used without the DS2000, the same results are obtained by pulling the $\overline{\text{RESET}}$ line on the PC1001 or ABC1500 (see Ref.1) to a logic '1', and the $\overline{\text{PAUSE}}$ line to logic '0'. When the program counter is clear, the PIPBUG program (see Ref.2) will respond with an asterisk (*) requesting further information.
3) Immediately after the asterisk type 'G' followed by the number which transfers control to the memory location at which the Prometheus program begins (see Ref.2). This number varies according to the input device used; if this is a teletype the number is 2200, and if it is a fast tape reader the number is 2204. The number must be followed by a carriage RETURN, and the assembler then responds by printing an identifying message confirming contact with the Prometheus program, followed by 'PASS = '.
4) Type '1' immediately after the latter response; the assembler then prints 'IDENTIFICATION'. On this line, the user can add a program name or number, or add any other identification to specify a particular assembly. Any character typed after 'IDENTIFICATION' is simply repeated back to the teletype printer, and has no effect on the assembler. An identifying message must be followed by a carriage RETURN, at which the assembler will automatically read in the source tape via the teletype or tape reader. As described earlier, on the first pass the assembler builds up a symbol table, and the number of symbols used in the program is printed in the form 'SYMBOLS USED n' where n is the number of valid symbols defined by the user; this is in addition to the 20 symbols predefined in the assembler. Only valid symbols are counted, and the number of such symbols must not exceed 365. This is followed by 'PASS = ', indicating that the assembler is ready for the second scan of the source tape.
5) Load the source tape into the reader as in step 1.
6) Type '2' after 'PASS = '. The assembler then automatically reads the source program line-by-line, performs the assembly, and prints out a listing of the assembly language program, including any error messages (a detailed discussion of a sample listing is given below). The assembler then prints 'TOTAL ASSEMBLER ERRORS n', where n is the number of error message symbols printed; if no errors occur, n will be zero. The assembler then prints 'PASS = '.
7) Load the source tape into the reader as in steps 1 and 5.
8) Type '3'. The assembler responds by printing 'TURN ON PUNCH AND TYPE A CHARACTER', a reminder to switch the teletype punch on to produce the hexadecimal tape; the character typed can be any character on the keyboard. The assembler then automatically reads in the source tape for the third and final pass. The hexadecimal tape is punched, and a listing of the hexadecimal translation of the program printed out, followed by 'PASS = '. If further copies of the assembly language or hexadecimal listings are required, or if another hexadecimal tape is required, the source tape may be loaded as in steps 1, 5, and 7 and a '2' or a '3' typed to repeat the second or third pass.
9) Press the RESET button (or pull the RESET line to logic '1') as before. The system responds with an (*) and is then ready for the loading of a program into the 2650 development system via PIPBUG.

Notes

1) If different programs are to be assembled immediately after each other, time is saved by loading the new program tape into the reader as in step 1 and typing a '1' after the final 'PASS = ' output during step 8. The assembly of the new program may then be continued from step 4 onwards.
2) In steps 4, 6, and 8, if any number other than '1', '2', or '3', is typed, the assembler will ignore this number and reprint 'PASS = ' until a '1', '2', or '3' is typed.
3) On pass 1 the symbol table needed for the assembly is built up; pass 1 must therefore be the first pass (step 4). However, as both passes 2 and 3 perform a complete assembly using this table, the order of these two passes may be shuffled if required.

SAMPLE LISTING

A typical printout from the assembler is shown in Fig.15; the brief explanations below refer to this listing.

1) LINE column: each assembled line is assigned a line number for identification purposes, which is printed in this column.
2) ADDR column: the numbers in this column are equal to the value of the assembly location counter, and indicate the address in storage at which the first byte of the line to be assembled is to be loaded. This column alternatively contains the value of a symbol defined by the line.
3) DATA columns (B1, B2, B3, B4): these columns describe the data bytes which are to be stored sequentially, starting at the address in the ADDR column.

```
*G2200

PROMETHEUS RESIDENT ASSEMBLER FOR 2650


PASS = 1
IDENTIFICATION EXAMPLE 5/4/77 11.44

SYMBOLS USED     0


PASS = 2



 2650 ASSEMBLER VER 1                                              PAGE  1

LINE ADDR B1 B2 B3 B4 ERROR SOURCE

   1                          *EXAMPLE WITH ERRORS
   2 0500                          ORG     H'500'
   3 0500 C0 C0 C0      L     START LODI,R0 3          LABEL TOO LONG
   4 0503 05 02           R         LODI R1 2          MISSING COMMA
   5 0505 86 00             A       ADDI,R2 1F         INVALID NUMBER
   6 0507 CC 00 00          U       STRA,R0 TEMP       UNDEFINED LABEL
   7 050A                           END

TOTAL ASSEMBLER ERRORS =    4


PASS = 3
TURN ON PUNCH AND TYPE A CHARACTER
:05000A3CC0C0C005028600CC0000F6
:00000000


PASS =
```

Fig.15 – Sample listing produced by Prometheus

4) ERROR column: this column may contain error codes, which are detailed below.

A – Argument error. The argument of an instruction has been coded in such a way that it cannot be resolved to a unique value.

F – Phase error. A symbol has a different value on the second pass to its value on the first. This error may occur for various reasons: 1) A tape may not have been returned to the start of the program and some definitions missed; 2) in a program consisting of several tapes (using the LIBR directive) the tapes have been fed in the wrong order; or 3) the symbol table has been exceeded, that is the program has defined more than 365 symbols. This error is not counted.

I – Index error. There is an error in the index field of the instruction.

L – Label error. The label contains too many characters, contains invalid characters, or begins with a number. After a Label error the rest of the statement is ignored, and three NOPs (see Instruction Set) will be assembled.

M – Multiple definition error. A symbol has been used before or is one of the 20 predefined symbols.

N – Number error. There is an error in the number of bytes specified by a DATA or RES directive, or in the number of lines specified by a SPC directive.

O – Op-code error. The mnemonic in the instruction field of the statement has not been recognised; this error generates three NOPs.

P – Paging error. A memory access instruction has attempted to access a storage location outside the current page of memory.
Note: Prometheus allows the value of the location counter ($) to cross page boundaries, but if this occurs in a program the resulting object tape will not run on the 2650.

R – Register field error. The register field could not be evaluated; or when evaluated was less than 0 or greater than 3; or could not be found.

S – Syntax error. A syntax rule has been violated or information additional to that required for an instruction has been included.

U – Undefined symbol error. An undefined symbol has been found in the argument field of the statement.

W – Warning. The indirection indicator has been used where it is not permitted. This error is not counted.

5) SOURCE section: this section reproduces the assembly language program as read by the assembler. Up to 44 logical columns will be reproduced on the listing.

6) HEXADECIMAL listing: after 'PASS = 3' the hexadecimal translation of the source tape is printed out, in the standard format required for loading via PIPBUG. Ref.8 gives details of this format.

REFERENCES

1. Signetics 2650 Introductory Brochure and Short Form Catalogue (order code 9399 509 55361).
2. 'Pipbug', Signetics Microprocessor Document SS50.
3. '2650 Demo System', Signetics Microprocessor Document SP51.
4. '2650 Evaluation Printed Circuit Board Level System (PC1001)', Signetics Microprocessor Document SP50.
5. '2650 Adaptable Board Computer (ABC1500)', Signetics Microprocessor Document SP55.
6. Hardware Specifications, Signetics Microprocessor Manual.
7. 'General Delay Routines', Signetics Microprocessor Document AS52.
8. 'Absolute Object Format (Revision 1)', Signetics Microprocessor Document SS51.

All these publications are available from Mullard Limited.

APPENDIX

PAPER-TAPE EDITOR

Once the Prometheus board has been installed in conjunction with the PC1001 or ABC1500, a new paper-tape editing facility is available, and may be used to simplify the modification of a program tape. The editor is supplied in the form of a paper tape containing the editor program, and the instructions for its use are given below.

1) Load the editor program into the memory of the PC1001 or ABC1500, using the PIPBUG loader command.
2) Load the tape which is to be modified into the teletype tape reader or fast tape reader at the beginning of the program, having removed the editor program tape.
3) Type G500 (if the teletype reader is used) or G504 (if the fast reader is used) to enter the editor program. The editor then causes a blank leader to be produced by the tape punch.
4) Type in any editing commands required. These consist of one of two characters, and are detailed below.

   Cn – copy n lines from the tape reader to the tape punch; n is in the range 1 to 9. The 'C' is optional, as copy mode is the default condition.

   Sn – skip n lines on the tape reader without copying; n is in the range 1 to 9.

   I – insert one line; information from the keyboard is copied by the tape punch until a RETURN is typed.

   A – append to line; one line is copied from the tape reader to the tape punch, stopping before the carriage return. Information from the keyboard is then copied by the punch until a RETURN is typed.

   E – end of tape; this command is used to complete an editing session, and outputs a blank trailer. The typing of any character then causes a new blank leader to be output and a new editing session may begin.

   R – copy remainder of tape; information is copied from the tape reader to the tape punch until a LIBR or END directive is encountered.

5) If the editing procedure is complete and an assembly or a run of a program is desired, press the RESET button (or pull the RESET line to a logic '1'). This returns control to PIPBUG, and the PIPBUG program then prints an asterisk (*) and waits for further instructions.

NOTES

1) Editor commands are not returned to the teletype, and are not printed on the listing.
2) If an unrecognised editing command is typed, it will be ignored.
3) A complete valid editing command is executed as soon as it is typed, and no carriage return is required after the command.
4) An S command or a C command can be cancelled by typing another command before the number of lines. For example, SC1 is equivalent to C1.
5) When additions or insertions are being typed after an A or I command, corrections may be made by use of the backspace (←) or CONTROL + X facilities (see the section on the punching of a source tape). If CONTROL + X is used, it will be copied to the tape punch and the line will be terminated by the output of a carriage return followed by a line feed.
6) Any addition or insertion (using the A or I command) is terminated by a carriage return; a line feed is automatically punched after the RETURN character on the output tape.
7) All lines output by the tape punch will be followed by two blank characters to separate the lines.

```
LINE   ADDR   LABL   B1 B2 B3 B4 ERROR SOURCE

   1                                PCH      ON                                  00000100
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

   2                          * Bits in PSL.                                                    00000300
   3        0001              CAR    EQU     H'01'       Carry bit.                            00000400
   4        0002              LCOM   EQU     H'02'       Compare bit.                          00000500
   5        0004              OVF    EQU     H'04'       Overflow bit.                         00000600
   6        0008              WC     EQU     H'08'       With carry bit.                       00000700
   7        0010              RS     EQU     H'10'       Register select bit.                  00000800
   8        0020              IDC    EQU     H'20'       Interdigit carry bit.                 00000900
   9        00C0              CC     EQU     H'C0'       Condition code bits.                  00001000
  10                          * Bits in PSU.                                                    00001100
  11        0007              SP     EQU     H'07'       Stack pointer.                        00001200
  12        0020              II     EQU     H'20'       Interrupt inhibit bit.                00001300
  13        0040              FLAG   EQU     H'40'       Flag bit.                             00001400
  14        0080              SENS   EQU     H'80'       Sense bit.                            00001500
  15                          * Register defenitions.                                           00001600
  16        0000              R0     EQU     0           Register 0.                           00001700
  17        0001              R1     EQU     1           Registers 1 and 1'.                   00001800
  18        0002              R2     EQU     2           Registers 2 and 2'.                   00001900
  19        0003              R3     EQU     3           Registers 3 and 3'.                   00002000
  20                          * Condition Code status.                                          00002100
  21        0000              Z      EQU     0           Zero condition.                       00002200
  22        0001              P      EQU     1           Positive condition.                   00002300
  23        0002              N      EQU     2           Negative condition.                   00002400
  24        0000              EQ     EQU     0           Equal condition.                      00002500
  25        0001              GT     EQU     1           Greater than condition.               00002600
  26        0002              LT     EQU     2           Less than condition.                  00002700
  27        0003              UN     EQU     3           Unconditional.                        00002800
  28                          ************************************************************    00002900
  29                          *                                                          *    00003000
  30                          *     PROMETHEUS RESIDENT ASSEMBLER COMMENT PART.          *    00003100
  31                          *                                                          *    00003200
  32                          ************************************************************    00003300
  33                          *          3800-3F21      LABEL BUFFER                           00003400
  34                          *          3F22                                                  00003500
  35                          *          3F23           PRINT FLAG                             00003600
  36                          *          3F24           FLAG3                                  00003700
  37                          *          3F25-3F28      BUF3 (4) ERROR BUFFER                  00003800
  38                          *          3F29           CRTL                                   00003900
  39                          *          3F2A-3F2D      BUF8 (4) NOT COMPRESSED LABEL          00004000
  40                          *          3F2E-3F30      BUF6 (3) COMPRESSED LABEL              00004100
  41                          *          3F31           COUNT2                                 00004200
  42                          *          3F32           COUNT2+1                               00004300
  43                          *          3F33           NRERR NUMBER OF ASSEMBLY ERRORS (BIN)  00004400
  44                          *          3F34           START ADDRESS OF OBJECT CODE           00004500
  45                          *          3F35           STAD0+1                                00004600
  46                          *          3F36           PAGE COUNT                             00004700
  47                          *          3F37           LINENR                                 00004800
  48                          *          3F38           LINENR+1                               00004900
  49                          *          3F39           ADDRES                                 00005000
  50                          *          3F3A           ADDRES+1                               00005100
  51                          *          3F3B           ENDFLG                                 00005200
  52                          *          3F3C           PASS                                   00005300
  53                          *          3F3D           MAXLAB MAXIMUM NUMBER OF LABELS        00005400
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

  54                          *          3F3E          MAXLAB+1                                                00005500
  55                          *          3F3F          LSTLAB LAST LABEL ADDRESS                               00005600
  56                          *          3F40          LSTLAB+1                                                00005700
  57                          *          3F41          LANR                                                    00005800
  58                          *          3F42          LANR+1                                                  00005900
  59                          *          3F43          POINT4                                                  00006000
  60                          *          3F44          POINT4+1                                                00006100
  61                          *          3F45-3F6C     PUF1 (40) TITLE BUFFER                                  00006200
  62                          *          3F6D          TEL1                                                    00006300
  63                          *          3F6E          TEL1+1                                                  00006400
  64                          *          3F6F          CNTRL1                                                  00006500
  65                          *          3F70          POINT5                                                  00006600
  66                          *          3F71          POINT5+1                                                00006700
  67                          *          3F72          AORTYP                                                  00006800
  68                          *          3F73          OPC1                                                    00006900
  69                          *          3F74          LINPAG LINES PER PAGE (DECREMENTING)                    00007000
  70                          *          3F75          CHARNR                                                  00007100
  71                          *          3F76          REG0A                                                   00007200
  72                          *          3F77          REG3A                                                   00007300
  73                          *          3F78          REG2A                                                   00007400
  74                          *          3F79          REG1A                                                   00007500
  75                          *          3F7A          REGOBJ NUMBER OF OBJECT BYTES PER LINE                  00007600
  76                          *          3F7B-3FC2     BUF5 (72) SOURCE CODE BUFFER                            00007700
  77                          *          3FC3          CHACNT NUMBER OF CHARACTERS IN BUF5                     00007800
  78                          *          3FC4          LABADR                                                  00007900
  79                          *          3FC5          LABADR+1                                                00008000
  80                          *          3FC6          BYTCOD NUMBER OF BYTES IN CODE                          00008100
  81                          *          3FC7          BYTE1                                                   00008200
  82                          *          3FC8          BYTE2                                                   00008300
  83                          *          3FC9          BYTE3                                                   00008400
  84                          *          3FCA-3FD6     BUF4 (13) OBJECT CODE BUFFER                            00008500
  85                          *          3FD7          ABUF RELATIVE ADDRESS ?                                 00008600
  86                          *          3FD8          ABUF+1                                                  00008700
  87                          *          3FD9          NEGCON IS H'FF',IF - APPEARS                            00008800
  88                          *          3FDA          TEKEN                                                   00008900
  89                          *          3FDB          STRLEN STRING LENGTH                                    00009000
  90                          *          3FDC          SCRPNT SOURCE POINTER                                   00009100
  91                          *          3FDD          CONTRL                                                  00009200
  92                          *          3FDE          INDIR IS 1,IF * APPEARS                                 00009300
  93                          *          3FDF          HAAK IS H'FF' IF >,0 IF <,ELSE 1                        00009400
  94                          *          3FE0          STRCON STRING CONTROL,0=B,1=H,2=D,3=D                   00009500
  95                          *          3FE1          DECMSB DECIMAL MSBYTE                                   00009600
  96                          *          3FE2          DECLSB                                                  00009700
  97                          *          3FE3-3FF4     BUF9                                                    00009800
  98                          *          3FF5-3FF8     BCDBUF                                                  00009900
  99                          *          3FF9                                                                  00010000
 100                          *          3FFA          REG2                                                    00010100
 101                          *          3FFB          REG3                                                    00010200
 102                          *          3FFC          DATA                                                    00010300
 103                          *          3FFD          NRBYTS                                                  00010400
 104                          *          3FFE          CHECK                                                   00010500
 105                          *          3FFF          CHSTOR                                                  00010600
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

 106                          ********************************************************************************  00010700
 107                          *                                                                              *  00010800
 108                          *          END OF PROMETHEUS RESIDENT ASSEMBLER COMMENT PART                   *  00010900
 109                          *                                                                              *  00011000
 110                          *          BEGIN OF CROSS-ASSMBLER UPDATE                                      *  00011100
 111                          *                                                                              *  00011200
 112                          ********************************************************************************  00011300
 113                                   ORG         H'3800'                                                     00011400
 114                          ********************************************************************************  00011500
 115       3800               LABUF      RES      H'722'                                                      00011600
 116                                   RES         1                                                           00011700
 117       3F23               PRFLAG     RES      1                                                           00011800
 118       3F24               FLAG3      RES      1                                                           00011900
 119       3F25               BUF3       RES      4                                                           00012000
 120       3F29               CRTL       RES      1                                                           00012100
 121       3F2A               BUF8       RES      4                                                           00012200
 122       3F2E               BUF6       RES      3                                                           00012300
 123       3F31               COUNT2     RES      2                                                           00012400
 124       3F33               NRERR      RES      1                                                           00012500
 125       3F34               STADD      RES      2                                                           00012600
 126       3F36               PAGCNT     RES      1                                                           00012700
 127       3F37               LINENR     RES      2                                                           00012800
 128       3F39               ADDRES     RES      2                                                           00012900
 129       3F3B               ENDFLG     RES      1                                                           00013000
 130       3F3C               PASS       RES      1                                                           00013100
 131       3F3D               MAXLAB     RES      2                                                           00013200
 132       3F3F               LSTLAB     RES      2                                                           00013300
 133       3F41               LANR       RES      2                                                           00013400
 134       3F43               POINT4     RES      2                                                           00013500
 135       3F45               BUF1       RES      40                                                          00013600
 136       3F6D               TEL1       RES      2                                                           00013700
 137       3F6F               CRTL1      RES      1                                                           00013800
 138       3F70               POINT5     RES      2                                                           00013900
 139       3F72               ADRTYP     RES      1                                                           00014000
 140       3F73               OPC1       RES      1                                                           00014100
 141       3F74               LINPAG     RES      1                                                           00014200
 142       3F75               CHARNR     RES      1                                                           00014300
 143       3F76               REG0A      RES      1                                                           00014400
 144       3F77               REG3A      RES      1                                                           00014500
 145       3F78               REG2A      RES      1                                                           00014600
 146       3F79               REG1A      RES      1                                                           00014700
 147       3F7A               REGOBJ     RES      1                                                           00014800
 148       3F7B               BUF5       RES      72                                                          00014900
 149       3FC3               CHACNT     RES      1                                                           00015000
 150       3FC4               LABADR     RES      2                                                           00015100
 151       3FC6               BYTCOD     RES      1                                                           00015200
 152       3FC7               BYTE1      RES      1                                                           00015300
 153       3FC8               BYTE2      RES      1                                                           00015400
 154       3FC9               BYTE3      RES      1                                                           00015500
 155       3FCA               BUF4       RES      13                                                          00015600
 156       3FD7               ABUF       RES      2                                                           00015700
 157       3FD9               NEGCON     RES      1                                                           00015800
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

 158        3FDA                    TEKEN       RES         1                                                00015900
 159        3FDB                    STRLEN      RES         1                                                00016000
 160        3FDC                    SRCPNT      RES         1                                                00016100
 161        3FDD                    CONTRL      RES         1                                                00016200
 162        3FDE                    INDIR       RES         1                                                00016300
 163        3FDF                    HAAK        RES         1                                                00016400
 164        3FE0                    STRCON      RES         1                                                00016500
 165        3FE1                    DECMSB      RES         1                                                00016600
 166        3FE2                    DECLSB      RES         1                                                00016700
 167        3FE3                    BUF9        RES         18                                               00016800
 168        3FF5                    BCDBUF      RES         4                                                00016900
 169                                            RES         1                                                00017000
 170        3FFA                    REG2        RES         1                                                00017100
 171        3FFB                    REG3        RES         1                                                00017200
 172        3FFC                    DATAS       RES         1                                                00017300
 173        3FFD                    NRBYTS      RES         1                                                00017400
 174        3FFE                    CHECK       RES         1                                                00017500
 175        3FFF                    CHSTOR      RES         1                                                00017600
 176                                ************************************************************************ 00017700
 177                                *                                                                      * 00017800
 178                                *           END OF CROSS-ASSEMBLER UPDATE                              * 00017900
 179                                *                                                                      * 00018000
 180                                *           BEGIN OF PROMETHEUS RESIDENT ASSEMBLER PROGRAM PART        * 00018100
 181                                *                                                                      * 00018200
 182                                ************************************************************************ 00018300
 183                                           ORG         H'2200'                                          00018400
 184                                ************************************************************************ 00018500
 185  2200  2200  04 80                TTYIN       LODI,R0     H'80'                                        00018600
 186  2202        1B 02                           BCTR,UN     SPRFL                                        00018700
 187                                ************************************************************************ 00018800
 188  2204  2204  04 00                FPTR        LODI,R0     0                                            00018900
 189  2206  2206  CC 1F 23             SPRFL       STRA,R0     PRFLAG                                       00019000
 190  2209        74 07                           CPSU        SP                                           00019100
 191  220B        77 02                           PPSL        LCOM                                         00019200
 192  220D        75 08                           CPSL        WC                                           00019300
 193  220F        07 28                           LODI,R3     40                                           00019400
 194  2211  2211  0F 4B A2             LOOP1       LODA,R0     MES1,R3,-                                    00019500
 195  2214        3F 2E 39                        BSTA,UN     WRCHAR                                       00019600
 196  2217        5B 78                           BRNR,R3     LOOP1                                        00019700
 197  2219  2219  07 0B                PRPASS      LODI,R3     11                                           00019800
 198  221B  221B  0F 4B CA             LOOP3       LODA,R0     MES2,R3,-                                    00019900
 199  221E        3F 2E 39                        BSTA,UN     WRCHAR                                       00020000
 200  2221        5B 78                           BRNR,R3     LOOP3                                        00020100
 201  2223        3F 2E 0F                        BSTA,UN     LEESCH                                       00020200
 202  2226        3F 2E 39                        BSTA,UN     WRCHAR                                       00020300
 203  2229        A4 30                           SUBI,R0     H'30'                                        00020400
 204  222B        99 6C                           BCFR,P      PRPASS                                       00020500
 205  222D        E4 03                           COMI,R0     3                                            00020600
 206  222F        19 68                           BCTR,P      PRPASS                                       00020700
 207  2231        CC 1F 7C                        STRA,R0     PASS                                         00020800
 208  2234        E4 01                           COMI,R0     1                                            00020900
 209  2236        9C 22 9C                        BCFA,Z      PASS2                                        00021000
```

```
ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

2239        07 11                          LODI,R3     17
223B  223B  0F 4B F1           LOOP4       LODA,R0     MES4+1,R3,-
223E        3F 2E 79                       BSTA,UN     WRCHAR
2241        5B 78                          BRNR,R3     LOOP4
2243  2243  3F 2E 0F           LOOP5       BSTA,UN     LEESCH
2246        3F 2E 79                       BSTA,UN     WRCHAR
2249        E4 0D                          COMI,R0     13
224B        98 76                          BCFR,Z      LOOP5
224D        04 60                          LODI,R0     H'60'
224F        07 01                          LODI,R3     1
2251        CF 1F 3D                       STRA,R3     MAXLAB
2254        CC 1F 3E                       STRA,R0     MAXLAB+1
2257        04 82                          LODI,R0     H'82'
2259        07 01                          LODI,R3     1
225B        CF 1F 3F                       STRA,R3     LSTLAB
225E        CC 1F 40                       STRA,R0     LSTLAB+1
2261        05 38                          LODI,R1     H'38'
2263        CD 1F 43                       STRA,R1     POINT4
2266        20                             EORZ        R0
2267        CC 1F 44                       STRA,R0     POINT4+1
226A        CD 1F 70                       STRA,R1     POINT5
226D        CC 1F 71                       STRA,R0     POINT5+1
2270        C1                             STRZ        R1
2271        C2                             STRZ        R2
2272  2272  04 7B              LOOP6       LODI,R0     H'7B'
2274        CC 9F 43                       STRA,R0     *POINT4
2277        0A 02                          BIRR,R2     INCREG
2279        09 00                          BIRR,R1     INCREG
227B  227B  E6 21              INCREG      COMI,R2     H'21'
227D        98 04                          BCFR,Z      INCPT4
227F        E5 07                          COMI,R1     7
2281        18 12                          BCTR,Z      KLRCLR
2283  2283  0F 1F 43           INCPT4      LODA,R3     POINT4
2286        0C 1F 44                       LODA,R0     POINT4+1
2289        D8 02                          BIRR,R0     STPT4
228B        DB 00                          BIRR,R3     STPT4
228D  228D  CC 1F 44           STPT4       STRA,R0     POINT4+1
2290        CF 1F 43                       STRA,R3     POINT4
2293        1B 5D                          BCTR,UN     LOOP6
                               *****************************************************************
2295  2295  20                 KLRCLR    EORZ        R0
2296        CC 1F 41                     STRA,R0     LANR
2299        CC 1F 42                     STRA,R0     LANR+1
229C  229C  05 38              PASS2     LODI,R1     H'38'
229E        06 00                        LODI,R2     0
22A0        07 00                        LODI,R3     0
22A2  22A2  CF 1F 60           LOOP7     STRA,R3     TEL1
22A5  22A5  CD 1F 43           LOOP8     STRA,R1     POINT4
22A8        CE 1F 44                     STRA,R2     POINT4+1
22AB        0C 9F 43                     LODA,R0     *POINT4
22AE        44 7F                        ANDI,R0     H'7F'
22B0        CC 9F 43                     STRA,R0     *POINT4
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

 262  22B3        86 05                    ADDI,R2     5                                00026300
 263  22B5        77 08                    PPSL        WC                               00026400
 264  22B7        85 00                    ADDI,R1     0                                00026500
 265  22B9        75 08                    CPSL        WC                               00026600
 266  22BB        0B 0A                    BIRR,R3     GNCR                             00026700
 267  22BD        0F 1F 6D                 LODA,R3     TEL1                             00026800
 268  22C0        87 01                    ADDI,R3     1                                00026900
 269  22C2        CF 1F 6D                 STRA,R3     TEL1                             00027000
 270  22C5        07 00                    LODI,R3     0                                00027100
 271  22C7  22C7  EF 1F 7E          GNCR    COMA,R3     MAXLAB+1                         00027200
 272  22CA        98 59                    BCFR,Z      LOOP8                            00027300
 273  22CC        CF 1F 6E                 STRA,R3     TEL1+1                           00027400
 274  22CF        0F 1F 6D                 LODA,R3     TEL1                             00027500
 275  22D2        EF 1F 7D                 COMA,R3     MAXLAB                           00027600
 276  22D5        18 06                    BCTR,Z      KLP1                             00027700
 277  22D7        0F 1F 6E                 LODA,R3     TEL1+1                           00027800
 278  22DA        1F 22 A5                 BCTA,UN     LOOP8                            00027900
 279                          ************************************************************ 00028000
 280  22DD  22DD  0C 1F 7C          KLR1    LODA,R0     PASS                             00028100
 281  22E0        E4 02                    COMI,R0     2                                00028200
 282  22E2        19 0B                    BCTR,P      PASS3                            00028300
 283  22E4        04 20                    LODI,R0     A' '                             00028400
 284  22E6  22E6  07 28             LOOP9   LODI,R3     H'28'                            00028500
 285  22E8  22E8  CF 5F 45          LOOP10  STRA,R0     BUF1,R3,-                        00028600
 286  22EB        5B 7B                    BRNR,R3     LOOP10                           00028700
 287  22ED        1B 16                    BCTR,UN     LOOP11                           00028800
 288                          ************************************************************ 00028900
 289  22EF  22EF  20                PASS3   EORZ        R0                               00029000
 290  22F0        CC 1F 24                 STRA,R0     FLAG3                            00029100
 291  22F3        07 24                    LODI,R3     36                               00029200
 292  22F5  22F5  0F 4C 2E          LOOP12  LODA,R0     MES7,R3,-                        00029300
 293  22F8        3F 2E 39                 BSTA,UN     WRCHAR                           00029400
 294  22FB        5B 78                    BRNR,R3     LOOP12                           00029500
 295  22FD        3F 2E 0F                 BSTA,UN     LEESCH                           00029600
 296  2300        3F 30 A3                 BSTA,UN     HEADER                           00029700
 297  2303        1B 61                    BCTR,UN     LOOP9                            00029800
 298                          ************************************************************ 00029900
 299  2305  2305  20            LOOP11    EORZ        R0                               00030000
 300  2306        07 0B                    LODI,R3     11                               00030100
 301  2308  2308  CF 5F 71        LOOP13    STRA,R0     COUNT2,R3,-                      00030200
 302  230B        5B 7B                    BRNR,R3     LOOP13                           00030300
 303  230D  230D  04 20           BLKBF3    LODI,R0     A(SP)                            00030400
 304  230F        07 04                    LODI,R3     4                                00030500
 305  2311  2311  CF 5F 25        LOOP14    STRA,R0     BUF3,R3,-                        00030600
 306  2314        5B 7B                    BRNR,R3     LOOP14                           00030700
 307  2316        20                       EORZ        R0                               00030800
 308  2317        07 15                    LODI,R3     21                               00030900
 309  2319  2319  CF 5F C4        LOOP15    STRA,R0     LABADR,R3,-                      00031000
 310  231C        5B 7B                    BRNR,R3     LOOP15                           00031100
 311  231E        3F 2F 53                 BSTA,UN     ENTTAP                           00031200
 312  2321        CC 1F 75                 STRA,R0     CHARNR                           00031300
 313  2324        0C 1F 7B                 LODA,R0     BUF5                             00031400
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

 314  2327        E4 2A                      COMI,R0     A'*'                    00031500
 315  2329        1C 2B 4B                   BCTA,EQ     STAR                    00031600
 316  232C        E4 20                      COMI,R0     ACSP1                   00031700
 317  232E        1C 23 FA                   BCTA,EQ     GEENLA                  00031800
 318  2331        3F 31 BC                   BSTA,UN     GETLAB                  00031900
 319  2334        9C 2A B6                   BCFA,Z      LABERR                  00032000
 320  2337        3F 2E 9A                   BSTA,UN     LABEL                   00032100
 321  233A        0C 1F 29                   LODA,R0     CRTL                    00032200
 322  233D        9C 2A B6                   BCFA,Z      LABERR                  00032300
 323  2340        3F 2E F2                   BSTA,UN     FILAB                   00032400
 324  2343        0C 1F 3C                   LODA,R0     PASS                    00032500
 325  2346        0E 1F 44                   LODA,R2     POINT4+1                00032600
 326  2349        0D 1F 43                   LODA,R1     POINT4                  00032700
 327  234C        E5 FF                      COMI,R1     255                     00032800
 328  234E        18 36                      BCTR,EQ     LABPL5                  00032900
 329  2350        E4 01                      COMI,R0     1                       00033000
 330  2352        18 28                      BCTR,Z      MULTER                  00033100
 331  2354        CD 1F C4                   STRA,R1     LABADR                  00033200
 332  2357        CE 1F C5                   STRA,R2     LABADR+1                00033300
 333  235A        0C 9F 43                   LODA,R0     *POINT4                 00033400
 334  235D        1A 1D                      BCTR,N      MULTER                  00033500
 335  235F        64 80                      IORI,R0     H'80'                   00033600
 336  2361        CC 9F 43                   STRA,R0     *POINT4                 00033700
 337  2364        3F 30 61                   BSTA,UN     PT4PL2                  00033800
 338  2367        07 02                      LODI,R3     2                       00033900
 339  2369  2369  0F FF 43          LOOP16    LODA,R0     *POINT4,R3              00034000
 340  236C        EF 5F 71                   COMA,R0     COUNT2,R3,-             00034100
 341  236F        98 04                      BCFR,EQ     PASS1                   00034200
 342  2371        5B 76                      BRNR,R3     LOOP16                  00034300
 343  2373        1B 04                      BCTR,UN     BRGNLA                  00034400
 344                                        ************************************** 00034500
 345  2375  2375  20                PASS1     EORZ        R0                      00034600
 346  2375        CC 1F 25                   STRA,R0     BUF3                    00034700
 347  2379  2379  1F 23 FA          BRGNLA    BCTA,UN     GEENLA                  00034800
 348                                        ************************************** 00034900
 349  237C  237C  04 4D                MULTER    LODI,R0     A'M'                00035000
 350  237E        CC 1F 25                   STRA,R0     BUF3                    00035100
 351  2381        3F 30 76                   BSTA,UN     INCERR                  00035200
 352  2384        1B 73                      BCTR,UN     BRGNLA                  00035300
 353                                        ************************************** 00035400
 354  2386  2386  0D 1F 41          LABPL5    LODA,R1     LANR                    00035500
 355  2389        1F 23 F5                   BCTA,UN     FULERR                  00035600
 356  238C        0E 1F 42                   LODA,R2     LANR+1                  00035700
 357  238F        EE 1F 7E                   COMA,R2     MAXLAB+1                00035800
 358  2392        98 28                      BCFR,Z      ADDLAB                  00035900
 359  2394        ED 1F 70                   COMA,R1     MAXLAB                  00036000
 360  2397        98 23                      BCFR,Z      ADDLAB                  00036100
 361  2399        65 80                      IORI,R1     H'80'                   00036200
 362  239B        CD 1F 41                   STRA,R1     LANR                    00036300
 363  239E        07 1D                      LODI,R3     29                      00036400
 364  23A0  23A0  0F 4C 01          LOOP17    LODA,R0     MES5,R3,-               00036500
 365  23A3        3F 2E 79                   BSTA,UN     WRCHAR                  00036600
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

 366  23A6        5B 78                    BRNR,R3     LOOP17                          00036700
 367  23A8        0D 1F 37                 LODA,R1     LINENR                          00036800
 368  23AB        0C 1F 38                 LODA,R0     LINENR+1                        00036900
 369  23AE        08 02                    BIRR,R0     LINEP1                          00037000
 370  23B0        09 00                    BIRR,R1     LINEP1                          00037100
 371  23B2  23B2  3F 31 4B          LINEP1  BSTA,UN     BINBCD                          00037200
 372  23B5        07 04                    LODI,R3     4                               00037300
 373  23B7        3F 31 A1                 BSTA,UN     PRBCD                           00037400
 374  23BA        1B 3E                    BCTR,UN     GEENLA                          00037500
 375                                  ********************************************************** 00037600
 376  23BC  23BC  0A 02            ADDLAB  BIRR,R2     INLANR                          00037700
 377  23BE        09 00                    BIRR,R1     INLANR                          00037800
 378  23C0  23C0  CD 1F 41          INLANR  STRA,R1     LANR                            00037900
 379  23C3        CE 1F 42                 STRA,R2     LANR+1                          00038000
 380  23C5        E4 01                    COMI,R0     1                               00038100
 381  23C8        98 28                    BCFR,Z      FULERR                          00038200
 382  23CA        07 05                    LODI,R3     5                               00038300
 383  23CC        0C 1F 71                 LODA,R0     POINT5+1                        00038400
 384  23CF        CC 1F 44                 STRA,R0     POINT4+1                        00038500
 385  23D2        CC 1F C5                 STRA,R0     LABADR+1                        00038600
 386  23D5        83                       ADDZ        R3                              00038700
 387  23D6        CC 1F 71                 STRA,R0     POINT5+1                        00038800
 388  23D9        0C 1F 70                 LODA,R0     POINT5                          00038900
 389  23DC        CC 1F 43                 STRA,R0     POINT4                          00039000
 390  23DF        CC 1F C4                 STRA,R0     LABADR                          00039100
 391  23E2        77 08                    PPSL        WC                              00039200
 392  23E4        84 00                    ADDI,R0     0                               00039300
 393  23E6        75 08                    CPSL        WC                              00039400
 394  23E8        CC 1F 70                 STRA,R0     POINT5                          00039500
 395  23EB  23EB  0F 5F 2E          LOOP18  LODA,R0     BUF6,R3,-                       00039600
 396  23EE        CF FF 43                 STRA,R0    *POINT4,R3                       00039700
 397  23F1        5B 78                    BRNR,R3     LOOP18                          00039800
 398  23F3        1B 05                    BCTR,UN     GEENLA                          00039900
 399                                  ********************************************************** 00040000
 400  23F5  23F5  04 46            FULERR  LODI,R0     A'F'                            00040100
 401  23F7        CC 1F 25                 STRA,R0     BUF3                            00040200
 402  23FA  23FA  3F 2F C0          GEENLA  BSTA,UN     ENDREG                          00040300
 403  23FD        9C 2A E0                 BCFA,Z      OPCERR                          00040400
 404  2400        3F 31 BC                 BSTA,UN     GETLAB                          00040500
 405  2403        99 05                    BCFR,P      GEENCT                          00040600
 406  2405        E4 2C                    COMI,R0     A','                            00040700
 407  2407        9C 2A E0                 BCFA,Z      OPCERR                          00040800
 408  240A  240A  CD 1F 6F          GEENCT  STRA,R1     CRTL1                           00040900
 409  240D        05 04                    LODI,R1     4                               00041000
 410  240F  240F  0D 5F 2A          LOOP19  LODA,R0     BUF8,R1,-                       00041100
 411  2412        E4 41                    COMI,R0     A'A'                            00041200
 412  2414        1A 04                    BCTR,N      BLNK                            00041300
 413  2416        59 77                    BRNR,R1     LOOP19                          00041400
 414  2418        1B 05                    BCTR,UN     SUB40                           00041500
 415                                  ********************************************************** 00041600
 416  241A  241A  E4 20            BLNK    COMI,R0     A' '                            00041700
 417  241C        9C 2A E0                 BCFA,Z      OPCERR                          00041800
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

 418  241E  241F  05 04          SUB40    LODI,R1    4                                  00041900
 419  2421  2421  0D 5F 2A       LOOP60   LODA,R0    BUF8,R1,-                          00042000
 420  2424        A4 40                   SUBI,R0    H'40'                              00042100
 421  2426        9A 01                   BCFR,N     NOBLK                              00042200
 422  2428        20                      EORZ       R0                                 00042300
 423  2429  2429  CD 7F 2A       NOBLK    STRA,R0    BUF8,R1                            00042400
 424  242C        59 73                   BRNR,R1    LOOP60                             00042500
 425  242E        0D 1F 2A                LODA,R1    BUF8                               00042600
 426  2431        01                      RRL,R1                                        00042700
 427  2432        01                      RRL,R1                                        00042800
 428  2433        01                      RRL,R1                                        00042900
 429  2434        0C 1F 2B                LODA,R0    BUF8+1                             00043000
 430  2437        C2                      STRZ       R2                                 00043100
 431  2438        50                      RRR,R0                                        00043200
 432  2439        50                      RRR,R0                                        00043300
 433  243A        44 07                   ANDI,R0    7                                  00043400
 434  243C        81                      ADDZ       R1                                 00043500
 435  243D        CC 1F 2E                STRA,R0    BUF6                               00043600
 436  2440        46 03                   ANDI,R2    3                                  00043700
 437  2442        52                      RRR,R2                                        00043800
 438  2443        52                      RRR,R2                                        00043900
 439  2444        0C 1F 2C                LODA,R0    BUF8+2                             00044000
 440  2447        00                      RRL,R0                                        00044100
 441  2448        82                      ADDZ       R2                                 00044200
 442  2449        0D 1F 2D                LODA,R1    BUF8+3                             00044300
 443  244C        F5 01                   TMI,R1     1                                  00044400
 444  244E        98 02                   BCFR,Z     STRLB                              00044500
 445  2450        84 01                   ADDI,R0    1                                  00044600
 446  2452  2452  CC 1F 2F       STRLB    STRA,R0    BUF6+1                             00044700
 447  2455        01                      RRL,R1                                        00044800
 448  2456        01                      RRL,R1                                        00044900
 449  2457        01                      RRL,R1                                        00045000
 450  2458        01                      RRL,R1                                        00045100
 451  2459        45 F0                   ANDI,R1    H'F0'                              00045200
 452  245B        CD 1F 30                STRA,R1    BUF6+2                             00045300
 453  245E        07 00                   LODI,R3    0                                  00045400
 454  2460  2460  E7 58          LOOP61   COMI,R3    H'58'                              00045500
 455  2462        10 2A F0                BCTA,P     OPCERR                             00045600
 456  2465        0F 6C 52                LODA,R0    ROMDA1,R3                          00045700
 457  2468        EC 1F 2E                COMA,R0    BUF6                               00045800
 458  246B        98 12                   BCFR,Z     NXTTRY                             00045900
 459  246D        0F 6C AB                LODA,R0    ROMDA2,R3                          00046000
 460  2470        EC 1F 2F                COMA,R0    BUF6+1                             00046100
 461  2473        98 0A                   BCFR,Z     NXTTRY                             00046200
 462  2475        0F 6D 04                LODA,R0    ROMDA3,R3                          00046300
 463  2478        44 F0                   ANDI,R0    H'F0'                              00046400
 464  247A        EC 1F 30                COMA,R0    BUF6+2                             00046500
 465  247D        18 04                   BCTR,Z     FNDOPC                             00046600
 466  247F  247F  87 01          NXTTRY   ADDI,R3    1                                  00046700
 467  2481        1B 5D                   BCTR,UN    LOOP61                             00046800
 468                                     ********************************************** 00046900
 469  2483  2483  0F 6D 04          FNDOPC   LODA,R0    ROMDA3,R3                      00047000
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

 470  2485        C1                          STRZ        R1                                  00047100
 471  2487        45 0F                       ANDI,R1     15                                  00047200
 472  2489        CD 1F 72                    STRA,R1     ADRTYP                              00047300
 473  248C        E5 01                       COMI,R1     1                                   00047400
 474  248E        18 06                       BCTR,Z      EENBYT                              00047500
 475  2490        0C 1F 75                    LODA,R0     BUF3                                00047600
 476  2493        3C 2A D9                    BSTA,Z      FFERR                               00047700
 477  2495  2496  0F 6D 5D          EENBYT     LODA,R0     ROMDA4,R3                           00047800
 478  2499        CC 1F 73                    STRA,R0     OPC1                                00047900
 479  249C        01                          RRL,R1                                          00048000
 480  249D        0D 64 B0                    LODA,R0     ROMDA5+D'-2',R1                     00048100
 481  24A0        CC 1F 43                    STRA,R0     POINT4                              00048200
 482  24A3        0D 24 B0                    LODA,R0     ROMDA5+D'-2',R1,+                   00048300
 483  24A6        CC 1F 44                    STRA,R0     POINT4+1                            00048400
 484  24A9        0F 1F 7C                    LODA,R3     PASS                                00048500
 485  24AC        0E 1F 6F                    LODA,R2     CRTL1                               00048600
 486  24AF        1F BF 43                    BCTA,UN     *POINT4                             00048700
 487                          ************************************************************* 00048800
 488  24B2  24B2  24 CA               ROMDA5  ACON        ASMDIR                              00048900
 489  24B4        27 FA                       ACON        DIV1BT                              00049000
 490  24B6        28 0C                       ACON        BT1REG                              00049100
 491  24B8        28 4F                       ACON        IMMED                               00049200
 492  24BA        28 4F                       ACON        IMMED                               00049300
 493  24BC        28 EE                       ACON        ABSOL                               00049400
 494  24BE        28 EE                       ACON        ABSOL                               00049500
 495  24C0        2A 07                       ACON        ZERINS                              00049600
 496  24C2        2A 1B                       ACON        PSW2BT                              00049700
 497  24C4        2A 2C                       ACON        ZRRSR                               00049800
 498  24C6        2A 4F                       ACON        BXASXA                              00049900
 499  24C8        2A 4F                       ACON        BXASXA                              00050000
 500                          ************************************************************* 00050100
 501  24CA  24CA  1D 2A F0          ASMDIR     BCTA,P      OPCERR                              00050200
 502  24CD        0D 1F 73                    LODA,R1     OPC1                                00050300
 503  24D0        98 1E                       BCFR,Z      TSTR11                              00050400
 504  24D2  24D2  0C 1F 75          LODERB     LODA,R0     BUF3                                00050500
 505  24D5        98 05                       BCFR,Z      FOUTA                               00050600
 506  24D7        04 20                       LODI,R0     A' '                                00050700
 507  24D9        CC 1F 75                    STRA,R0     BUF3                                00050800
 508  24DC  24DC  01                FOUTA     RRL,R1                                          00050900
 509  24DD        0D 64 FC                    LODA,R0     ROMDA6,R1                           00051000
 510  24E0        CC 1F 43                    STRA,R0     POINT4                              00051100
 511  24E3        0D 24 FC                    LODA,R0     ROMDA6,R1,+                         00051200
 512  24E6        CC 1F 44                    STRA,R0     POINT4+1                            00051300
 513  24E9        47 03                       ANDI,R3     3                                   00051400
 514  24EB        E6 FF                       COMI,R2     255                                 00051500
 515  24ED        1F BF 43                    BCTA,UN     *POINT4                             00051600
 516                          ************************************************************* 00051700
 517  24F0  24F0  E5 01             TSTR11     COMI,R1     1                                   00051800
 518  24F2        18 5E                       BCTR,Z      LODERB                              00051900
 519  24F4        0C 1F 75                    LODA,R0     BUF3                                00052000
 520  24F7        3C 2A D9                    BSTA,Z      FFERR                               00052100
 521  24FA        1B 56                       BCTR,UN     LODERB                              00052200
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

 522                          ********************************************************************************  00052300
 523  24FC  24FC  25 14        ROMDA6      ACON        ORGINS                                                   00052400
 524  24FE        25 63                    ACON        EQUINS                                                   00052500
 525  2500        25 86                    ACON        ENDINS                                                   00052600
 526  2502        26 0E                    ACON        DATAIN                                                   00052700
 527  2504        26 84                    ACON        RESINS                                                   00052800
 528  2506        26 C7                    ACON        EJEINS                                                   00052900
 529  2508        26 E9                    ACON        ACONIN                                                   00053000
 530  250A        27 10                    ACON        SPCINS                                                   00053100
 531  250C        27 3A                    ACON        PRTINS                                                   00053200
 532  250E        27 68                    ACON        PCHINS                                                   00053300
 533  2510        27 9F                    ACON        TITLIN                                                   00053400
 534  2512        27 C5                    ACON        LIBRIN                                                   00053500
 535                          ********************************************************************************  00053600
 536  2514  2514  1C 2A F3    ORGINS      BCTA,Z      AERRO                                                    00053700
 537  2517        3F 33 45                 BSTA,UN     CONTST                                                   00053800
 538  251A        1E 28 10                 BCTA,N      UERRO                                                    00053900
 539  251D        1D 2A F3                 BCTA,P      AERRO                                                    00054000
 540  2520        3C 2F 0A                 BSTA,Z      DMPOBJ                                                   00054100
 541  2523        00 1F 07                 LODA,R1     ABUF                                                     00054200
 542  2526        1E 2A F3                 BCTA,N      AERRO                                                    00054300
 543  2529        0E 1F 08                 LODA,R2     ABUF+1                                                   00054400
 544  252C        CD 1F 71                 STRA,R1     COUNT2                                                   00054500
 545  252F        CE 1F 72                 STRA,R2     COUNT2+1                                                 00054600
 546  2532        CD 1F 79                 STRA,R1     ADDRES                                                   00054700
 547  2535        CE 1F 7A                 STRA,R2     ADDRES+1                                                 00054800
 548  2538        CD 1F 74                 STRA,R1     STADD                                                    00054900
 549  253B        CE 1F 75                 STRA,R2     STADD+1                                                  00055000
 550  253E        0C 1F C4                 LODA,R0     LABADR                                                   00055100
 551  2541        18 1D                    BCTR,Z      BRSTR1                                                   00055200
 552  2543  2543  0F 1F 25    MULTY       LODA,R3     BUF3                                                     00055300
 553  2546        E7 4D                    COMI,R3     A'M'                                                     00055400
 554  2548        18 16                    BCTR,Z      BRSTR1                                                   00055500
 555  254A        CC 1F 43                 STRA,R0     POINT4                                                   00055600
 556  254D        0C 1F C5                 LODA,R0     LABADR+1                                                 00055700
 557  2550        CC 1F 44                 STRA,R0     POINT4+1                                                 00055800
 558  2553        3F 30 61                 BSTA,UN     PT4PL2                                                   00055900
 559  2556        07 02                    LODI,R3     2                                                        00056000
 560  2558  2558  0F 7F 78    LOOP62      LODA,R0     ADDRES+0'-1',R3                                          00056100
 561  255B        CF FF 43                 STRA,R0    *POINT4,R3                                                00056200
 562  255E        FB 78                    BDRR,R3     LOOP62                                                   00056300
 563  2560  2560  1F 2B 4B    BRSTR1      BCTA,UN     STAR                                                     00056400
 564                          ********************************************************************************  00056500
 565  2563  2563  1C 2A F3    EQUINS      BCTA,Z      AERRO                                                    00056600
 566  2566        3F 33 45                 BSTA,UN     CONTST                                                   00056700
 567  2569        1F 28 10                 BCTA,UN     UERRO                                                    00056800
 568  256C        1D 2A F3                 BCTA,P      AERRO                                                    00056900
 569  256F        00 1F 07                 LODA,R1     ABUF                                                     00057000
 570  2572        0E 1F 08                 LODA,R2     ABUF+1                                                   00057100
 571  2575        CD 1F 79                 STRA,R1     ADDRES                                                   00057200
 572  2578        CE 1F 7A                 STRA,R2     ADDRES+1                                                 00057300
 573  257B        05 00                    LODI,R1     0                                                        00057400
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

574   257D        0C 1F C4                LODA,R0     LABADR                    00057500
575   2580        1C 2A 00                BCTA,Z      LERR0                     00057600
576   2583        1F 25 43                BCTA,UN     MULTY                     00057700
577               ************************************************************* 00057800
578   2586  2586  CO 1F 7B          ENDINS STRA,R1     ENDFLG                    00057900
579   2589        18 1F                   BCTR,Z      BRSTAR                    00058000
580   258B        3F 2F CO                BSTA,UN     ENDREG                    00058100
581   258E        9C 25 AA                BCFA,Z      BRSTAR                    00058200
582   2591        3F 33 45                BSTA,UN     CONTST                    00058300
583   2594        19 07                   BCTR,P      AERR22                    00058400
584   2596        1A 15                   BCTR,N      UERR22                    00058500
585   2598        0C 1F D7                LODA,R0     ABUF                      00058600
586   259B        9A 0D                   BCFR,N      BRSTAR                    00058700
587   259D  259D  04 41             AERR22 LODI,R0     A'A'                      00058800
588   259F  259F  CC 1F 27          STERR2 STRA,R0     BUF3+2                    00058900
589   25A2        0C 1F 73                LODA,R0     NRERR                     00059000
590   25A5        D8 00                   BIRR,R0     ERPL1                     00059100
591   25A7  25A7  CC 1F 73          ERPL1  STRA,R0     NRERR                     00059200
592   25AA  25AA  1F 28 4B          BRSTAR BCTA,UN     STAR                      00059300
593               ************************************************************* 00059400
594   25AD  25AD  04 55             UERR22 LODI,R0     A'U'                      00059500
595   25AF        1B 6E                   BCTR,UN     STERR2                    00059600
596               ************************************************************* 00059700
597   25B1  25B1  0C 1F 7C          ENDPAS LODA,R0     PASS                      00059800
598   25B4        44 3F                   ANDI,R0     H'3F'                     00059900
599   25B6        E4 02                   COMI,R0     2                         00060000
600   25B8        98 1A                   BCFR,Z      EINDE                     00060100
601   25BA        07 1C                   LODI,R3     28                        00060200
602   25BC  25BC  0F 4B D5          LOOP74 LODA,R0     MES3,R3,-                 00060300
603   25BF        3F 2E 39                BSTA,UN     WRCHAR                    00060400
604   25C2        5B 78                   BRNR,R3     LOOP74                    00060500
605   25C4        05 00                   LODI,R1     0                         00060600
606   25C6        0C 1F 73                LODA,R0     NRERR                     00060700
607   25C9        3F 31 4B                BSTA,UN     BINBCD                    00060800
608   25CC        07 03                   LODI,R3     3                         00060900
609   25CE        3F 31 A1                BSTA,UN     PRBCD                     00061000
610   25D1  2501  1F 22 19          BRPRPS BCTA,UN     PRPASS                    00061100
611               ************************************************************* 00061200
612   25D4  25D4  E4 03             EINDE  COMI,R0     3                         00061300
613   25D6        98 1C                   BCFR,Z      SYMUSE                    00061400
614   25D8        3F 2F DA                BSTA,UN     DMPOBJ                    00061500
615   25DB        0C 1F D7                LODA,R0     ABUF                      00061600
616   25DE        0E 1F D8                LODA,R2     ABUF+1                    00061700
617   25E1        CC 1F 74                STRA,R0     STADD                     00061800
618   25E4        CE 1F 75                STRA,R2     STADD+1                   00061900
619   25E7        07 FF                   LODI,R3     255                       00062000
620   25E9        CF 1F 24                STRA,R3     FLAG3                     00062100
621   25EC        3F 2F DA                BSTA,UN     DMPOBJ                    00062200
622   25EF        3F 30 A3                BSTA,UN     HEADER                    00062300
623   25F2        1B 50                   BCTR,UN     BRPRPS                    00062400
624               ************************************************************* 00062500
625   25F4  25F4  07 10             SYMUSE LODI,R3     16                        00062600
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

 625  25F5  25F6  0F 4C 1E          LOOP76    LODA,R3     MES6,R3,-                    00062700
 627  25F9        3F 2E 79                    BSTA,UN     WRCHAR                       00062800
 628  25FC        58 78                       BRNR,R3     LOOP76                       00062900
 629  25FE        00 1F 41                    LODA,R1     LANR                         00063000
 630  2601        0C 1F 42                    LODA,R0     LANR+1                       00063100
 631  2604        3F 31 4B                    BSTA,UN     BINBCD                       00063200
 632  2607        07 04                       LODI,R3     4                            00063300
 633  2609        3F 31 A1                    BSTA,UN     PRBCD                        00063400
 634  260C        18 43                       BCTR,UN     BRPRPS                       00063500
 635                                          ************************************************************ 00063600
 636  260E  260E  1C 2A FF          DATAIN    BCTA,Z      AERR1                        00063700
 637  2611        3F 2F C0                    BSTA,UN     ENDREG                       00063800
 638  2614        9C 2A FF                    BCFA,Z      AERR1                        00063900
 639  2617        CF 1F D9                    STRA,R3     NEGCON                       00064000
 640  261A        3F 30 7F                    BSTA,UN     INCCNT                       00064100
 641  261D        3F 34 B4                    BSTA,UN     STRING                       00064200
 642  2620        1A 16                       BCTR,N      LAB1                         00064300
 643  2622        19 38                       BCTR,P      LAB2                         00064400
 644  2624        00 1F DB                    LODA,R1     STRLEN                       00064500
 645  2627  2627  65 00          LOOP63    IORI,R1     0                            00064600
 646  2629        18 2E                       BCTR,Z      CONTIN                       00064700
 647  262B        00 7F E2                    LODA,R0     BUF9+0'-1',R1                00064800
 648  262E        C0 7F C6                    STRA,R0     BYTE1+0'-1',R1               00064900
 649  2631        F9 74                       BDRR,R1     LOOP63                       00065000
 650  2633        00 1F DB                    LODA,R1     STRLEN                       00065100
 651  2636        1B 21                       BCTR,UN     CONTIN                       00065200
 652                                          ************************************************************ 00065300
 653  2638  2638  0F 1F D9          LAB1      LODA,R3     NEGCON                       00065400
 654  263B        CF 1F 75                    STRA,R3     CHARNR                       00065500
 655  263E        3F 33 45                    BSTA,UN     CONTST                       00065600
 656  2641        1E 2B 14                    BCTA,N      UERR1                        00065700
 657  2644        1D 2A FF                    BCTA,P      AERR1                        00065800
 658  2647        00 1F D7                    LODA,R1     ABUF                         00065900
 659  264A        18 05                       BCTR,Z      LAB3                         00066000
 660  264C        E5 FF                       COMI,R1     255                          00066100
 661  264E        9C 26 78                    BCFA,Z      LAB4                         00066200
 662  2651  2651  0E 1F D8          LAB3      LODA,R2     ABUF+1                       00066300
 663  2654        CE 1F C7                    STRA,R2     BYTE1                        00066400
 664  2657        05 01                       LODI,R1     1                            00066500
 665  2659  2659  1F 2B 48          CONTIN    BCTA,UN     CONLIN                       00066600
 666                                          ************************************************************ 00066700
 667  265C  265C  E4 01          LAB2      COMI,R0     1                            00066800
 668  265E        19 08                       BCTR,P      LAB5                         00066900
 669  2660        00 1F DB                    LODA,R1     STRLEN                       00067000
 670  2663        1C 2A FF                    BCTA,Z      AERR1                        00067100
 671  2666        1B 18                       BCTR,UN     AER4                         00067200
 672                                          ************************************************************ 00067300
 673  2668  2668  05 10          LAB5      LODI,R1     16                           00067400
 674  266A  266A  04 4E          NER16     LODI,R0     A'N'                         00067500
 675  266C  266C  CC 1F 27          STBF3     STRA,R0     BUF3+2                       00067600
 676  266F        3F 30 76                    BSTA,UN     INCERR                       00067700
 677  2672        C0 1F DB                    STRA,R1     STRLEN                       00067800
```

```
ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

2675        1F 26 77                         BCTA,UN    LOOP63         00067900
                        **************************************************************** 00068000
2678  2678  05 01                   LAB4     LODI,R1    1              00068100
267A        20                               EORZ       R0             00068200
267B        CC 1F F3                         STRA,R0    BUF9           00068300
267E        1B 6A                            BCTR,UN    NER16          00068400
                        **************************************************************** 00068500
2680  2680  04 41                   AER4     LODI,R0    A'A'           00068600
2682        1B 68                            BCTR,UN    STBF3          00068700
                        **************************************************************** 00068800
2684  2684  1C 2A F3                RESINS   BCTA,Z     AERRO          00068900
2687        3F 33 45                         BSTA,UN    CONTST         00069000
268A        1E 28 10                         BCTA,N     UERRO          00069100
268D        1D 2A F3                         BCTA,P     AERRO          00069200
2690        0D 1F D7                         LODA,R1    ABUF           00069300
2693        1A 2D                            BCTR,N     NERO           00069400
2695        0F 1F 7C                         LODA,R3    PASS           00069500
2698        E7 03                            COMI,R3    3              00069600
269A        3C 2F DA                         BSTA,Z     DMPOBJ         00069700
269D        0D 1F D7                         LODA,R1    ABUF           00069800
26A0        0E 1F D8                         LODA,R2    ABUF+1         00069900
26A3        8E 1F 32                         ADDA,R2    COUNT2+1       00070000
26A6        77 08                            PPSL       WC             00070100
26A8        8D 1F 31                         ADDA,R1    COUNT2         00070200
26AB        75 08                            CPSL       WC             00070300
26AD        CD 1F 31                         STRA,R1    COUNT2         00070400
26B0        CE 1F 32                         STRA,R2    COUNT2+1       00070500
26B3        CD 1F 34                         STRA,R1    STADD          00070600
26B6        CE 1F 35                         STRA,R2    STADD+1        00070700
26B9        0C 1F DE                         LODA,R0    INDIR          00070800
26BC        9C 2B 41                         BCFA,Z     WERR           00070900
26BF        1F 2B 4B                         BCTA,UN    STAR           00071000
                        **************************************************************** 00071100
26C2  26C2  05 00                   NERO     LODI,R1    0              00071200
26C4        1F 26 6A                         BCTA,UN    NER16          00071300
                        **************************************************************** 00071400
26C7  26C7  E7 02                   EJEINS   COMI,R3    2              00071500
26C9        98 08                            BCFR,Z     NXTPAG         00071600
26CB  26CB  0D 1F 74                EJECT    LODA,R1    LINPAG         00071700
26CE  26CE  3F 2E C6                LOOP64   BSTA,UN    LF             00071800
26D1        F9 7B                            BDRR,R1    LOOP64         00071900
26D3  26D3  3F 30 AA                NXTPAG   BSTA,UN    NEWPAG         00072000
26D6  26D6  0C 1F 78                INCLNR   LODA,R0    LINENR+1       00072100
26D9        D8 08                            BIRR,R0    GCARLN         00072200
26DB        0D 1F 77                         LODA,R1    LINENR         00072300
26DE        D9 00                            BIRR,R1    LAB6           00072400
26E0  26E0  CD 1F 77                LAB6     STRA,R1    LINENR         00072500
26E3  26E3  CC 1F 78                GCARLN   STRA,R0    LINENR+1       00072600
26E5        1F 23 9D                         BCTA,UN    BLKBF3         00072700
                        **************************************************************** 00072800
26E9  26E9  1C 2A FB                ACONIN   BCTA,Z     AERR2          00072900
26EC        05 02                            LODI,R1    2              00073000
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

 730  26EE        E7 01                    COMI,R3     1                                00073100
 731  26F0        1C 2B 48                 BCTA,Z      CONLIN                           00073200
 732  26F3        3F 33 45                 BSTA,UN     CONTST                           00073300
 733  26F6        1E 2B 18                 BCTA,N      UERR2                            00073400
 734  26F9        10 2A FB                 BCTA,P      AERR2                            00073500
 735  26FC        0D 1F D7                 LODA,R1     ABUF                             00073600
 736  26FF        1E 2A FB                 BCTA,N      AERR2                            00073700
 737  2702        0E 1F D8                 LODA,R2     ABUF+1                           00073800
 738  2705        CD 1F C7                 STRA,R1     BYTE1                            00073900
 739  2708        CE 1F C8                 STRA,R2     BYTE2                            00074000
 740  270B        05 02                    LODI,R1     2                                00074100
 741  270D        1F 2B 48                 BCTA,UN     CONLIN                           00074200
 742                          ************************************************************* 00074300
 743  2710  2710  1C 2A F3     SPCINS      BCTA,Z      AERR0                            00074400
 744  2713        E7 02                    COMI,R3     2                                00074500
 745  2715        9C 2B 4B                 BCFA,Z      STAR                             00074600
 746  2718        3F 33 45                 BSTA,UN     CONTST                           00074700
 747  271B        1E 2B 10                 BCTA,N      UERR0                            00074800
 748  271E        10 2A F3                 BCTA,P      AERR0                            00074900
 749  2721        0D 1F D7                 LODA,R1     ABUF                             00075000
 750  2724        9C 26 C2                 BCFA,Z      NER0                             00075100
 751  2727        0D 1F D8                 LODA,R1     ABUF+1                           00075200
 752  272A        18 0B                    BCTR,Z      BRINLN                           00075300
 753  272C        ED 1F 74                 COMA,R1     LINPAR                           00075400
 754  272F        9E 26 CE                 BCFA,N      LOOP64                           00075500
 755  2732  2732  3F 2E D6     LOOP65      BSTA,UN     LF                               00075600
 756  2735        F9 7B                    BDRR,R1     LOOP65                           00075700
 757  2737  2737  1F 26 D6     BRINLN      BCTA,UN     INCLNR                           00075800
 758                          ************************************************************* 00075900
 759  273A  273A  1C 2A F3     PRTINS      BCTA,Z      AERR0                            00076000
 760  273D        E7 02                    COMI,R3     2                                00076100
 761  273F        9C 2B 4B                 BCFA,Z      STAR                             00076200
 762  2742        3F 2F C0                 BSTA,UN     ENDREG                           00076300
 763  2745        0F 7F 7B                 LODA,R0     BUF5,R3                          00076400
 764  2748        E4 CF                    COMI,R0     H'CF'                            00076500
 765  274A        9C 2A F3                 BCFA,Z      AERR0                            00076600
 766  274D        0F 3F 7B                 LODA,R0     BUF5,R3,+                        00076700
 767  2750        E4 CE                    COMI,R0     H'CE'                            00076800
 768  2752        18 10                    BCTR,Z      CL8PAS                           00076900
 769  2754        E4 C6                    COMI,R0     H'C6'                            00077000
 770  2756        9C 2A F3                 BCFA,Z      AERR0                            00077100
 771  2759        0C 1F 3C                 LODA,R0     PASS                             00077200
 772  275C        64 80                    IORI,R0     H'80'                            00077300
 773  275E  275E  CC 1F 7C     LOOP66      STRA,R0     PASS                             00077400
 774  2761        1F 2B 4B                 BCTA,UN     STAR                             00077500
 775                          ************************************************************* 00077600
 776  2764  2764  0C 1F 3C     CL8PAS      LODA,R0     PASS                             00077700
 777  2767        44 7F                    ANDI,R0     H'7F'                            00077800
 778  2769        1B 73                    BCTR,UN     LOOP66                           00077900
 779                          ************************************************************* 00078000
 780  276B  276B  1C 2A F3     PCHINS      BCTA,Z      AERR0                            00078100
 781  276E        E7 03                    COMI,R3     3                                00078200
```

```
LINE  ADDR  LABL  81 82 83 84 ERROR SOURCE

 782  2770        9C 2B 4B                    BCFA,Z      STAR                                00078300
 783  2773        3F 2F C0                    BSTA,UN     ENDREG                              00078400
 784  2776        0F 7F 78                    LODA,R0     BUF5,R3                             00078500
 785  2779        E4 CF                       COMI,R0     H'CF'                               00078600
 786  277B        9C 2A E3                    BCFA,Z      AERR0                               00078700
 787  277E        0F 3F 78                    LODA,R0     BUF5,R3,+                           00078800
 788  2781        E4 CE                       COMI,R0     H'CE'                               00078900
 789  2783        18 13                       BCTR,Z      CL4PAS                              00079000
 790  2785        E4 C6                       COMI,R0     H'C6'                               00079100
 791  2787        9C 2A E3                    BCFA,Z      AERR0                               00079200
 792  278A        3F 2F DA                    BSTA,UN     DMPOBJ                              00079300
 793  278D        0C 1F 7C                    LODA,R0     PASS                                00079400
 794  2790        64 40                       IORI,R0     H'40'                               00079500
 795  2792  2792  CC 1F 7C          LOOP67    STRA,R0     PASS                                00079600
 796  2795        1F 28 4B                    BCTA,UN     STAR                                00079700
 797                                 ********************************************************* 00079800
 798  2798  2798  0C 1F 7C          CL4PAS    LODA,R0     PASS                                00079900
 799  2798        44 BF                       ANDI,R0     H'BF'                               00080000
 800  279D        18 73                       BCTR,UN     LOOP67                              00080100
 801                                 ********************************************************* 00080200
 802  279F  279F  E7 02              TITLIN    COMI,R3     2                                   00080300
 803  27A1        9C 26 D6                    BCFA,Z      INCLNR                              00080400
 804  27A4        06 28                       LODI,R2     40                                  00080500
 805  27A5        3F 2F C0                    BSTA,UN     ENDREG                              00080600
 806  27A9        98 10                       BCFR,Z      KLTITL                              00080700
 807  27AB        0F 1F 75                    LODA,R3     CHARNR                              00080800
 808  27AE  27AE  0F 3F 7A          LOOP68    LODA,R0     BUF5+D'-1',R3,+                     00080900
 809  27B1        18 08                       BCTR,Z      KLTITL                              00081000
 810  27B3        CE 5F 45                    STRA,R0     BUF1,R2,-                           00081100
 811  27B6        5A 76                       BRNR,R2     LOOP68                              00081200
 812  27B8  27B8  1F 26 C8          LOOP69    BCTA,UN     EJECT                               00081300
 813                                 ********************************************************* 00081400
 814  27BB  27BB  04 20              KLTITL    LODI,R0     A' '                                00081500
 815  27BD  27BD  CE 5F 45          LOOP70    STRA,R0     BUF1,R2,-                           00081600
 816  27C0        5A 7B                       BRNR,R2     LOOP70                              00081700
 817  27C2        1F 27 B8                    BCTA,UN     LOOP69                              00081800
 818                                 ********************************************************* 00081900
 819  27C5  27C5  05 00              LIBRIN    LODI,R1     0                                   00082000
 820  27C7        CD 1F C6                    STRA,R1     BYTCOD                              00082100
 821  27CA        3F 2F DA                    BSTA,UN     DMPOBJ                              00082200
 822  27CD        0C 1F 7C                    LODA,R0     PASS                                00082300
 823  27D0        44 3F                       ANDI,R0     H'3F'                               00082400
 824  27D2        CC 1F 7C                    STRA,R0     PASS                                00082500
 825  27D5        E4 02                       COMI,R0     2                                   00082600
 826  27D7        98 08                       BCFR,Z      BRCRLF                              00082700
 827  27D9        3F 30 88                    BSTA,UN     INCLIN                              00082800
 828  27DC        3F 32 C8                    BSTA,UN     PRLIN                               00082900
 829  27DF        18 13                       BCTR,UN     NXTCAR                              00083000
 830                                 ********************************************************* 00083100
 831  27E1  27E1  3F 2E 00          BRCRLF    BSTA,UN     CRLF                                00083200
 832  27E4        0F 1F 75                    LODA,R3     CHARNR                              00083300
 833  27E7  27E7  EF 1F C3          LOOP71    COMA,R3     CHACNT                              00083400
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

 834  27EA        19 08                    BCTR,P      NXTCAR                          00083500
 835  27EC        0F 3F 7A                 LODA,R0     BUF5+0*-1*,R3,+                 00083600
 836  27EF        3F 2E 79                 BSTA,UN     WRCHAR                          00083700
 837  27F2        1B 73                    BCTR,UN     LOOP71                          00083800
 838                                  ********************************************** 00083900
 839  27F4  27F4  3F 2E 0F            NXTCAR BSTA,UN     LEESCH                          00084000
 840  27F7        1F 23 0D                 BCTA,UN     BLKBF3                          00084100
 841                                  ********************************************** 00084200
 842  27FA  27FA  3D 2B 04            DIV1BT BSTA,P      RERR                            00084300
 843  27FD        E7 01                    COMI,R3     1                               00084400
 844  27FF        18 06                    BCTR,Z      CONLN1                          00084500
 845  2801        0C 1F 73                 LODA,R0     OPC1                            00084600
 846  2804        CC 1F C7                 STRA,R0     BYTE1                           00084700
 847  2807  2807  05 01            CONLN1 LODI,R1     1                               00084800
 848  2809        1F 2B 48                 BCTA,UN     CONLIN                          00084900
 849                                  ********************************************** 00085000
 850  280C  280C  BD 2B 04            BT1REG BSFA,P      RERR                            00085100
 851  280F        E7 01                    COMI,R3     1                               00085200
 852  2811        18 2B                    BCTR,Z      WERR11                          00085300
 853  2813        3F 30 7F                 BSTA,UN     INCCNT                          00085400
 854  2815  2816  3F 33 45            LOOP72 BSTA,UN     CONTST                          00085500
 855  2819        0E 1F 73                 LODA,R2     OPC1                            00085600
 856  281C        64 00                    IORI,R0     0                               00085700
 857  281E        9B 29                    BCFR,Z      RER04                           00085800
 858  2820        0D 1F D7                 LODA,R1     ABUF                            00085900
 859  2823        98 24                    BCFR,Z      RER04                           00086000
 860  2825        0C 1F D8                 LODA,R0     ABUF+1                          00086100
 861  2828        E4 03                    COMI,R0     3                               00086200
 862  282A        1D 28 49                 BCTA,P      RER04                           00086300
 863  282D        B2                       ADDZ        R2                              00086400
 864  282E  282E  98 02            TESTBT BCFR,Z      STBYT1                          00086500
 865  2830        04 60                    LODI,R0     H'60'                           00086600
 866  2832  2832  CC 1F C7          STBYT1 STRA,R0     BYTE1                           00086700
 867  2835        E4 40                    COMI,R0     H'40'                           00086800
 868  2837  2837  1C 2B 20          BRSER  BCTA,Z      SERR1                           00086900
 869  283A        E4 C0                    COMI,R0     H'C0'                           00087000
 870  283C        18 79                    BCTR,Z      BRSER                           00087100
 871  283E  283E  05 01            WERR11 LODI,R1     1                               00087200
 872  2840        0C 1F DE                 LODA,R0     INDIR                           00087300
 873  2843        9C 2B 3E                 BCFA,Z      WERR1                           00087400
 874  2846        1F 2B 48                 BCTA,UN     CONLIN                          00087500
 875                                  ********************************************** 00087600
 876  2849  2849  3F 2B 04            RER04  BSTA,UN     RERR                            00087700
 877  284C        02                       LODZ        R2                              00087800
 878  284D        18 5F                    BCTR,UN     TESTBT                          00087900
 879                                  ********************************************** 00088000
 880  284F  284F  BD 2B 04            IMMED  BSFA,P      RERR                            00088100
 881  2852        E7 01                    COMI,R3     1                               00088200
 882  2854        1C 2B BC                 BCTA,Z      CONTL2                          00088300
 883  2857        3F 30 7F                 BSTA,UN     INCCNT                          00088400
 884  285A        3F 33 45                 BSTA,UN     CONTST                          00088500
 885  285D        0E 1F 73                 LODA,R2     OPC1                            00088600
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

 886  2860        64 00                    IORI,R0      0                        00088700
 887  2862        9C 28 C3                 BCFA,Z       RERR6                    00088800
 888  2865        00 1F D7                 LODA,R1      ABUF                     00088900
 889  2868        9C 28 C3                 BCFA,Z       RERR6                    00089000
 890  2868        0C 1F D8                 LODA,R0      ABUF+1                   00089100
 891  286E        E4 03                    COMI,R0      3                        00089200
 892  2870        10 28 C3                 BCTA,P       RERR6                    00089300
 893  2873        82                       ADDZ         R2                       00089400
 894  2874        CC 1F C7                 STRA,R0      BYTE1                    00089500
 895  2877        E4 98                    COMI,R0      H'98'                    00089600
 896  2879        1C 28 DC                 BCTA,Z       BRREL                    00089700
 897  287C        E4 BB                    COMI,R0      H'BB'                    00089800
 898  287E        98 05                    BCFR,Z       BRSUBR                   00089900
 899  2880        04 38                    LODI,R0      H'38'                    00090000
 900  2882        1F 28 DE                 BCTA,UN      SERBR                    00090100
 901                                  ********************************************************************** 00090200
 902  2885  2885  3F 33 45          BRSUBR  BSTA,UN      CONTST                   00090300
 903  2888        19 B7                    BCTR,P      *ADAER2                   00090400
 904  288A        1E 28 18                 BCTA,N       UERR2                    00090500
 905  288D        0C 1F 72                 LODA,R0      ADRTYP                   00090600
 906  2890        E4 05                    COMI,R0      5                        00090700
 907  2892        1C 28 F3                 BCTA,EQ      CALBT2                   00090800
 908  2895        E4 0A                    COMI,R0      10                       00090900
 909  2897        1C 2A 30                 BCTA,EQ      LAB7                     00091000
 910  289A        0D 1F D7                 LODA,R1      ABUF                     00091100
 911  289D        18 04                    BCTR,Z       LODBF2                   00091200
 912  289F        E5 FF                    COMI,R1      255                      00091300
 913  28A1        98 9E                    BCFR,Z      *ADAER2                   00091400
 914  28A3  28A3  0E 1F D8          LODBF2  LODA,R2      ABUF+1                   00091500
 915  28A5        CE 1F C8                 STRA,R2      BYTE2                    00091600
 916  28A9        0C 1F DE                 LODA,R0      INDIR                    00091700
 917  28AC        9C 28 3C                 BCFA,Z       WERR2                    00091800
 918  28AF  28AF  0F 1F 75          LOOP73  LODA,R3      CHARNR                   00091900
 919  28B2        0F 3F 7A                 LODA,R0      BUF5+0'-1',R3,+          00092000
 920  28B5        18 05                    BCTR,Z       CONTL2                   00092100
 921  28B7        E4 20                    COMI,R0       A[SP]                   00092200
 922  28B9        9C 28 24                 BCFA,Z       SERR2                    00092300
 923  28BC  28BC  05 02          CONTL2  LODI,R1      2                        00092400
 924  28BE        1F 28 48                 BCTA,UN      CONLIN                   00092500
 925                                  ********************************************************************** 00092600
 926  28C1  28C1  2A E8          ADAER2  ACON         AERR2                    00092700
 927                                  ********************************************************************** 00092800
 928  28C3  28C3  CE 1F C7          RERR6   STRA,R2       BYTE1                  00092900
 929  28C6        04 52                    LODI,R0       A'R'                   00093000
 930  28C8        CC 1F 76                 STRA,R0       BUF3+1                 00093100
 931  28CB        3F 30 76                 BSTA,UN       INCERR                 00093200
 932  28CE        1F 28 B5                 BCTA,UN       BRSUBR                 00093300
 933                                  ********************************************************************** 00093400
 934  28D1  28D1  04 53          SER5    LODI,R0       A'S'                   00093500
 935  28D3        CC 1F 78                 STRA,R0       BUF3+3                 00093600
 936  28D6        3F 30 76                 BSTA,UN       INCERR                 00093700
 937  28D9        1F 28 B5                 BCTA,UN       BRSUBR                 00093800
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

 938                          ********************************************************************************  00093900
 939  280C  280C  04 1B        BRREL     LODI,R0     H'1B'                                                      00094000
 940  280E  280E  CC 1F C7     SERBR     STRA,R0     BYTE1                                                      00094100
 941  28E1        1B 6E                  BCTR,UN     SER5                                                       00094200
 942                          ********************************************************************************  00094300
 943  28E3  28E3  3F 36 F7     CALBT2    BSTA,UN     CALADR                                                     00094400
 944  28E5        98 09                  BCFR,Z      *ADAER2                                                    00094500
 945  28E8        CE 1F C8               STRA,R2     BYTE2                                                      00094600
 946  28EB        1F 28 AF               BCTA,UN     LOOP73                                                     00094700
 947                          ********************************************************************************  00094800
 948  28EE  28EE  9D 2B 04     ABSOL     BCFA,P      RERR                                                       00094900
 949  28F1        E7 01                  COMI,R3     1                                                          00095000
 950  28F3        1C 29 C8               BCTA,Z      NOG3BT                                                     00095100
 951  28F6        3F 30 7F               BSTA,UN     INCCNT                                                     00095200
 952  28F9        3F 33 45               BSTA,UN     CONTST                                                     00095300
 953  28FC        0E 1F 73               LODA,R2     OPC1                                                       00095400
 954  28FF        64 00                  IORI,R0     0                                                          00095500
 955  2901        9C 29 D7               BCFA,Z      RERR4                                                      00095600
 956  2904        0D 1F D7               LODA,R1     ABUF                                                       00095700
 957  2907        9C 29 D7               BCFA,Z      RERR4                                                      00095800
 958  290A        0C 1F D8               LODA,R0     ABUF+1                                                     00095900
 959  290D        E4 03                  COMI,R0     3                                                          00096000
 960  290F        1D 29 D7               BCTA,P      RERR4                                                      00096100
 961  2912        82                     ADDZ        R2                                                         00096200
 962  2913        CC 1F C7               STRA,R0     BYTE1                                                      00096300
 963  2916        E4 9F                  COMI,R0     H'9F'                                                      00096400
 964  2918        1C 29 F0               BCTA,Z      SERR8                                                      00096500
 965  291B        E4 BF                  COMI,R0     H'BF'                                                      00096600
 966  291D        98 05                  BCFR,Z      CALB23                                                     00096700
 967  291F        04 3F                  LODI,R0     H'3F'                                                      00096800
 968  2921        1F 29 F2               BCTA,UN     SERR6                                                      00096900
 969                          ********************************************************************************  00097000
 970  2924  2924  3F 33 45     CALB23    BSTA,UN     CONTST                                                     00097100
 971  2927        1D 2A F7               BCTA,P      AERR3                                                      00097200
 972  292A        1E 2B 1C               BCTA,N      UERR3                                                      00097300
 973  292D        0D 1F D7               LODA,R1     ABUF                                                       00097400
 974  2930        1E 2A F7               BCTA,N      AERR3                                                      00097500
 975  2933        0C 1F 72               LODA,R0     AORTYP                                                     00097600
 976  2936        E4 07                  COMI,R0     7                                                          00097700
 977  2938        1C 29 F7               BCTA,Z      SETIND                                                     00097800
 978  2938        04 60                  LODI,R0     H'60'                                                      00097900
 979  2930        4C 1F 71               ANDA,R0     COUNT2                                                     00098000
 980  2940        45 60                  ANDI,R1     H'60'                                                      00098100
 981  2942        E1                     COMZ        R1                                                         00098200
 982  2943        9C 2B 72               BCFA,EQ     PERR3                                                      00098300
 983  2946        0D 1F D7               LODA,R1     ABUF                                                       00098400
 984  2949        45 9F                  ANDI,R1     H'9F'                                                      00098500
 985  294B        0E 1F D8               LODA,R2     ABUF+1                                                     00098600
 986  294E        0C 1F DE               LODA,R0     INDIR                                                      00098700
 987  2951        18 02                  BCTR,Z      BT2STR                                                     00098800
 988  2953        64 80                  IORI,R0     H'80'                                                      00098900
 989  2955  2955  C0 1F C8     BT2STR    STRA,R1     BYTE2                                                      00099000
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

 990  2958        CE 1F C9                  STRA,R2      BYTE3                                          00099100
 991  2958        0F 1F 75                  LODA,R3      CHARNR                                         00099200
 992  295E        0F 3F 7A                  LODA,R0      BUF5+0'-1',R3,+                                00099300
 993  2961        1C 29 9E                  BCTA,Z       LOONX3                                         00099400
 994  2964        CF 1F 75                  STRA,R3      CHARNR                                         00099500
 995  2967        E4 20                     COMI,R0      A' '                                           00099600
 996  2969        1C 29 9E                  BCTA,Z       LOONX3                                         00099700
 997  296C        E4 2C                     COMI,R0      A',',                                          00099800
 998  296E        9C 29 CD                  BCFA,Z       IERR                                           00099900
 999  2971        3F 33 45                  BSTA,UN      CONTST                                         00100000
1000  2974        9C 29 CD                  BCFA,Z       IERR                                           00100100
1001  2977        0D 1F D7                  LODA,R1      ABUF                                           00100200
1002  297A        9C 29 CD                  BCFA,Z       IERR                                           00100300
1003  297D        0C 1F D8                  LODA,R0      ABUF+1                                         00100400
1004  2980        E4 03                     COMI,R0      3                                              00100500
1005  2982        1D 29 CD                  BCTA,P       IERR                                           00100600
1006  2985        0E 1F C7                  LODA,R2      BYTE1                                          00100700
1007  2988        46 03                     ANDI,R2      3                                              00100800
1008  298A        9C 2B 28                  BCFA,Z       SERR3                                          00100900
1009  298D        6C 1F C7                  IORA,R0      BYTE1                                          00101000
1010  2990        CC 1F C7                  STRA,R0      BYTE1                                          00101100
1011  2993        0F 1F 75                  LODA,R3      CHARNR                                         00101200
1012  2996        0D 1F C8                  LODA,R1      BYTE2                                          00101300
1013  2999        0F 3F 7A                  LODA,R0      BUF5+0'-1',R3,+                                00101400
1014  299C        18 1B                     BCTR,Z       SET60                                          00101500
1015  299E        E4 20                     COMI,R0      A' '                                           00101600
1016  29A0        18 17                     BCTR,Z       SET60                                          00101700
1017  29A2        E4 2C                     COMI,R0      A',',                                          00101800
1018  29A4        98 27                     BCFR,Z       IERR                                           00101900
1019  29A5        0F 3F 7A                  LODA,R0      BUF5+0'-1',R3,+                                00102000
1020  29A9        E4 2B                     COMI,R0      A'+'                                           00102100
1021  29AB        98 04                     BCFR,Z       COMMIN                                         00102200
1022  29AD  29AD  65 20           SET20       IORI,R1      H'20'                                          00102300
1023  29AF        1B 0A                     BCTR,UN      STRB2                                          00102400
1024  29B1  29B1  E4 20           COMMIN      COMI,R0      H'20' !!!!!!!!!!!                              00102500
1025  29B3        98 18                     BCFR,Z       IERR                                           00102600
1026  29B5  29B5  65 40           SET40       IORI,R1      H'40'                                          00102700
1027  29B7        1B 02                     BCTR,UN      STRB2                                          00102800
1028                            ********************************************************************** 00102900
1029  29B9  29B9  65 60           SET60       IORI,R1      H'60'                                          00103000
1030  29BB  29BB  CD 1F C8        STRB2       STRA,R1      BYTE2                                          00103100
1031  29BE  29BE  0F 3F 7A        LOONX3      LODA,R0      BUF5+0'-1',R3,+                                00103200
1032  29C1        18 05                     BCTR,Z       NOG3BT                                         00103300
1033  29C3        E4 20                     COMI,R0      A' '                                           00103400
1034  29C5        9C 2B 28                  BCFA,Z       SERR3                                          00103500
1035  29C8  29C8  05 03           NOG3BT      LODI,R1      3                                              00103600
1036  29CA        1F 2B 48                  BCTA,UN      CONLIN                                         00103700
1037                            ********************************************************************** 00103800
1038  29CD  29C0  04 49           IERR        LODI,R0      A'I'                                           00103900
1039  29CF        CC 1F 27                  STRA,R0      BUF3+2                                         00104000
1040  2902        3F 30 76                  BSTA,UN      INCERR                                         00104100
1041  2905        1B 67                     BCTR,UN      LOONX3                                         00104200
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

1042                          ********************************************************************************  00104300
1043  29D7  29D7  CE 1F C7       RERR4       STRA,R2       BYTE1                                                 00104400
1044  29DA        04 52                     LODI,R0       A'R'                                                  00104500
1045  29DC        CC 1F D6                  STRA,R0       BUF3+1                                                00104600
1046  29DF        3F 30 76                  BSTA,UN       INCERR                                                00104700
1047  29E2        1F 29 24                  BCTA,UN       CALB23                                                00104800
1048                          ********************************************************************************  00104900
1049  29E5  29E5  04 53       SERR7       LODI,R0       A'S'                                                  00105000
1050  29E7        CC 1F D8                  STRA,R0       BUF3+3                                                00105100
1051  29EA        3F 30 76                  BSTA,UN       INCERR                                                00105200
1052  29ED        1F 29 24                  BCTA,UN       CALB23                                                00105300
1053                          ********************************************************************************  00105400
1054  29F0  29F0  04 1F       SERR8       LODI,R0       H'1F'                                                 00105500
1055  29F2  29F2  CC 1F C7     SERR6       STRA,R0       BYTE1                                                 00105600
1056  29F5        1B 6E                     BCTR,UN       SERR7                                                 00105700
1057                          ********************************************************************************  00105800
1058  29F7  29F7  0C 1F DE     SETIND      LODA,R0       INDIR                                                 00105900
1059  29FA        18 02                     BCTR,Z        STBYT2                                                00106000
1060  29FC        65 80                     IORI,R1       H'80'                                                 00106100
1061  29FE  29FE  CD 1F C8     STBYT2      STRA,R1       BYTE2                                                 00106200
1062  2A01        CE 1F C9                  STRA,R2       BYTE3                                                 00106300
1063  2A04        1F 29 BE                  BCTA,UN       LODNX3                                                00106400
1064                          ********************************************************************************  00106500
1065  2A07  2A07  BC 2B 04     ZERINS      BSFA,Z        RERR                                                  00106600
1066  2A0A        E7 01                     COMI,R3       1                                                     00106700
1067  2A0C        1C 28 C7                  BCTA,Z        CONLN1                                                00106800
1068  2A0F        0E 1F 73                  LODA,R2       OPC1                                                  00106900
1069  2A12        3F 2F C0                  BSTA,UN       ENDREG                                                00107000
1070  2A15        9C 28 49                  BCFA,Z        RER04                                                 00107100
1071  2A18        1F 28 16                  BCTA,UN       LOOP72                                                00107200
1072                          ********************************************************************************  00107300
1073  2A1B  2A1B  BC 2B 04     PSW2BT      BSFA,Z        RERR                                                  00107400
1074  2A1E        E7 01                     COMI,R3       1                                                     00107500
1075  2A20        1D 28 BC                  BCTA,P        CONTL2                                                00107600
1076  2A23        0E 1F 73                  LODA,R2       OPC1                                                  00107700
1077  2A26        CE 1F C7                  STRA,R2       BYTE1                                                 00107800
1078  2A29        1F 28 B5                  BCTA,UN       BRSUBR                                                00107900
1079                          ********************************************************************************  00108000
1080  2A2C  2A2C  9C 2B 04     ZBRRSR      BCFA,Z        RERR                                                  00108100
1081  2A2F        E7 01                     COMI,R3       1                                                     00108200
1082  2A31        1C 28 BC                  BCTA,Z        CONTL2                                                00108300
1083  2A34        0C 1F 73                  LODA,R0       OPC1                                                  00108400
1084  2A37        CC 1F C7                  STRA,R0       BYTE1                                                 00108500
1085  2A3A        3F 28 B5                  BSTA,UN       BRSUBR                                                00108600
1086  2A3D  2A3D  0E 1F D8     LAB7        LODA,R2       ABUF+1                                                00108700
1087  2A40        0D 1F D7                  LODA,R1       ABUF                                                  00108800
1088  2A43        3F 37 11                  BSTA,UN       RELMAX                                                00108900
1089  2A46        9C 2A F8                  BCFA,Z        AERR2                                                 00109000
1090  2A49        CE 1F C8                   STRA,R2       BYTE2                                                00109100
1091  2A4C        1F 28 AF                   BCTA,UN       LOOP73                                               00109200
1092                          ********************************************************************************  00109300
1093  2A4F  2A4F  BC 2B 04     BXASXA       BSFA,Z        RERR                                                 00109400
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

1094  2A52        E7 01                   COMI,R3     1                                  00109500
1095  2A54        1C 29 C8                BCTA,Z      NOG3BT                             00109600
1096  2A57        0C 1F 73                LODA,R0     OPC1                               00109700
1097  2A5A        CC 1F C7                STRA,R0     BYTE1                              00109800
1098  2A5D        0C 1F 6F                LODA,R0     CRTL1                              00109900
1099  2A60        18 03                   BCTR,Z      LAB8                               00110000
1100  2A62        3F 30 7F                BSTA,UN     INCCNT                             00110100
1101  2A65  2A65  3F 33 45          LAB8  BSTA,UN     CONTST                             00110200
1102  2A68        1D 2A E7                BCTA,P      AERR3                              00110300
1103  2A6B        1E 2B 1C                BCTA,N      UERR3                              00110400
1104  2A6E        0D 1F D7                LODA,R1     ABUF                               00110500
1105  2A71        1E 2A E7                BCTA,N      AERR3                              00110600
1106  2A74        0E 1F D8                LODA,R2     ABUF+1                             00110700
1107  2A77        0C 1F DE                LODA,R0     INDIR                              00110800
1108  2A7A        18 02                   BCTR,Z      STBYT                              00110900
1109  2A7C        65 80                   IORI,R1     H'80'                              00111000
1110  2A7E  2A7E  CD 1F C8          STBYT STRA,R1     BYTE2                              00111100
1111  2A81        CE 1F C9                STRA,R2     BYTE3                              00111200
1112  2A84        0C 1F 72                LODA,R0     ADRTYP                             00111300
1113  2A87        E4 0C                   COMI,R0     12                                 00111400
1114  2A89        18 28                   BCTR,Z      BRLNXT                             00111500
1115  2A8B        0F 1F 75                LODA,R3     CHARNR                             00111600
1116  2A8E        0F 3F 7A                LODA,R0     BUFS+D'-1',R3,+                    00111700
1117  2A91        18 20                   BCTR,Z      BRLNXT                             00111800
1118  2A93        CF 1F 75                STRA,R3     CHARNR                             00111900
1119  2A96        E4 20                   COMI,R0     A' '                               00112000
1120  2A98        18 19                   BCTR,Z      BRLNXT                             00112100
1121  2A9A        E4 2C                   COMI,R0     A','                               00112200
1122  2A9C        9C 29 C0                BCFA,Z      IERR                               00112300
1123  2A9F        3F 33 45                BSTA,UN     CONTST                             00112400
1124  2AA2        9C 29 C0                BCFA,Z      IERR                               00112500
1125  2AA5        0D 1F D7                LODA,R1     ABUF                               00112600
1126  2AA8        9C 29 C0                BCFA,Z      IERR                               00112700
1127  2AAB        0E 1F D8                LODA,R2     ABUF+1                             00112800
1128  2AAE        E6 03                   COMI,R2     3                                  00112900
1129  2AB0        9C 29 C0                BCFA,Z      IERR                               00113000
1130  2AB3  2AB3  1F 29 BE          BRLNXT BCTA,UN    LODNX3                             00113100
1131              ********************************************************************** 00113200
1132  2AB6  2AB6  04 4C             LABERR LODI,R0     A'L'                               00113300
1133  2AB8        CC 1F 25                STRA,R0     BUF3                               00113400
1134  2ABB  2ABB  20                PT7WO EORZ        R0                                 00113500
1135  2ABC        CC 1F 72                STRA,R0     ADRTYP                             00113600
1136  2ABF        04 C0                   LODI,R0     H'C0'                              00113700
1137  2AC1        07 03                   LODI,R3     3                                  00113800
1138  2AC3  2AC3  CF 5F C7          LOOP80 STRA,R0     BYTE1,R3,-                         00113900
1139  2AC6        5B 7B                   BRNR,R3     LOOP80                             00114000
1140  2AC8        05 03                   LODI,R1     3                                  00114100
1141  2ACA  2ACA  3F 30 76          ERRPL1 BSTA,UN     INCERR                             00114200
1142  2ACD        1F 2B 48                BCTA,UN     CONLIN                             00114300
1143              ********************************************************************** 00114400
1144  2AD0  2AD0  04 4C             LERR0  LODI,R0     A'L'                               00114500
1145  2AD2        CC 1F 25                STRA,R0     BUF3                               00114600
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

1146  2AD5        05 00              LODI,R1     0                                  00114700
1147  2AD7        1B 71              BCTR,UN     ERRPL1                             00114800
1148                      ********************************************************** 00114900
1149  2AD9  2AD9  04 46        FFERR LODI,R0     A'F'                               00115000
1150  2ADB        CC 1F 25           STRA,R0     BUF3                               00115100
1151  2ADE        1B 29              BCTR,UN     BRERR                              00115200
1152                      ********************************************************** 00115300
1153  2AE0  2AE0  04 4F        OPCERR LODI,R0    A'O'                               00115400
1154  2AE2        CC 1F 26           STRA,R0     BUF3+1                             00115500
1155  2AE5        1B 54              BCTR,UN     PT7W0                              00115600
1156                      ********************************************************** 00115700
1157  2AE7  2AE7  05 03        AERR3 LODI,R1     3                                  00115800
1158  2AE9        1B 0A              BCTR,UN     AERR                               00115900
1159                      ********************************************************** 00116000
1160  2AEB  2AEB  05 02        AERR2 LODI,R1     2                                  00116100
1161  2AED        1B 06              BCTR,UN     AERR                               00116200
1162                      ********************************************************** 00116300
1163  2AEF  2AEF  05 01        AERR1 LODI,R1     1                                  00116400
1164  2AF1        1B 02              BCTR,UN     AERR                               00116500
1165                      ********************************************************** 00116600
1166  2AF3  2AF3  05 00        AERR0 LODI,R1     0                                  00116700
1167  2AF5  2AF5  04 41        AERR  LODI,R0     A'A'                               00116800
1168  2AF7  2AF7  CC 1F 27      STERR STRA,R0     BUF3+2                             00116900
1169  2AFA        04 00              LODI,R0     0                                  00117000
1170  2AFC        CC 1F C8           STRA,R0     BYTE2                              00117100
1171  2AFF        CC 1F C9           STRA,R0     BYTE3                              00117200
1172  2B02        1B 46              BCTR,UN     ERRPL1                             00117300
1173                      ********************************************************** 00117400
1174  2B04  2B04  04 52        RERR  LODI,R0     A'R'                               00117500
1175  2B06        CC 1F 26           STRA,R0     BUF3+1                             00117600
1176  2B09  2B09  1F 30 76    BRERR  BCTA,UN     INCERR                             00117700
1177                      ********************************************************** 00117800
1178  2B0C  2B0C  04 55        UERR  LODI,R0     A'U'                               00117900
1179  2B0E        1B 67              BCTR,UN     STERR                              00118000
1180                      ********************************************************** 00118100
1181  2B10  2B10  05 00        UERR0 LODI,R1     0                                  00118200
1182  2B12        1B 78              BCTR,UN     UERR                               00118300
1183                      ********************************************************** 00118400
1184  2B14  2B14  05 01        UERR1 LODI,R1     1                                  00118500
1185  2B16        1B 74              BCTR,UN     UERR                               00118600
1186                      ********************************************************** 00118700
1187  2B18  2B18  05 02        UERR2 LODI,R1     2                                  00118800
1188  2B1A        1B 70              BCTR,UN     UERR                               00118900
1189                      ********************************************************** 00119000
1190  2B1C  2B1C  05 03        UERR3 LODI,R1     3                                  00119100
1191  2B1E        1B 6C              BCTR,UN     UERR                               00119200
1192                      ********************************************************** 00119300
1193  2B20  2B20  05 01        SERR1 LODI,R1     1                                  00119400
1194  2B22        1B 06              BCTR,UN     SERR                               00119500
1195                      ********************************************************** 00119600
1196  2B24  2B24  05 02        SERR2 LODI,R1     2                                  00119700
1197  2B26        1B 02              BCTR,UN     SERR                               00119800
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

1198                          ********************************************************************************  00119900
1199  2828  2828  05 03       SERR3       LODI,R1       3                                                      00120000
1200  282A  282A  04 53       SERR        LODI,R0       A'S'                                                   00120100
1201  282C        CC 1F 28                  STRA,R0       BUF3+3                                                 00120200
1202  282F        1F 2A CA                  BCTA,UN       ERRPL1                                                 00120300
1203                          ********************************************************************************  00120400
1204  2832  2832  05 03       PERR3       LODI,R1       3                                                      00120500
1205  2834        04 50                     LODI,R0       A'P'                                                   00120600
1206  2836        CC 1F 27                  STRA,R0       BUF3+2                                                 00120700
1207  2839        1F 2A CA                  BCTA,UN       ERRPL1                                                 00120800
1208                          ********************************************************************************  00120900
1209  283C  283C  05 02       WERR2       LODI,R1       2                                                      00121000
1210  283E  283E  CD 1F C6    WERR1       STRA,R1       BYTCOD                                                 00121100
1211  2841  2841  04 57       WERR        LODI,R0       A'W'                                                   00121200
1212  2843        CC 1F 27                  STRA,R0       BUF3+2                                                 00121300
1213  2846        18 03                     BCTR,UN       STAR                                                   00121400
1214                          ********************************************************************************  00121500
1215  2848  2848  CD 1F C6    CONLIN      STRA,R1       BYTCOD                                                 00121600
1216  2848  2848  3F 30 88    STAR        BSTA,UN       INCLIN                                                 00121700
1217  284E        98 07                     BCFR,Z        GEENCR                                                 00121800
1218  2850        E4 01                     COMI,R0       1                                                      00121900
1219  2852        98 03                     BCFR,Z        GEENCR                                                 00122000
1220  2854        3F 30 AA                  BSTA,UN       NEWPAG                                                 00122100
1221  2857  2857  3F 32 08    GEENCR      BSTA,UN       PRLIN                                                  00122200
1222  285A        0E 1F 72                  LODA,R2       COUNT2+1                                               00122300
1223  285D        8E 1F C6                  ADDA,R2       BYTCOD                                                 00122400
1224  2860        CE 1F 72                  STRA,R2       COUNT2+1                                               00122500
1225  2863        0D 1F 71                  LODA,R1       COUNT2                                                 00122600
1226  2865        77 08                     PPSL          WC                                                     00122700
1227  2868        85 00                     ADDI,R1       0                                                      00122800
1228  286A        CD 1F 71                  STRA,R1       COUNT2                                                 00122900
1229  286D        75 08                     CPSL          WC                                                     00123000
1230  286F        CD 1F 39                  STRA,R1       ADDRES                                                 00123100
1231  2872        CE 1F 3A                  STRA,R2       ADDRES+1                                               00123200
1232  2875        0C 1F 3C                  LODA,R0       PASS                                                   00123300
1233  2879        44 7F                     ANDI,R0       H'7F'                                                  00123400
1234  287A        E4 03                     COMI,R0       3                                                      00123500
1235  287C        98 18                     BCFR,Z        RET                                                    00123600
1236  287E        0C 1F C6                  LODA,R0       BYTCOD                                                 00123700
1237  2881        18 16                     BCTR,Z        RET                                                    00123800
1238  2883        C3                        STRZ          R3                                                     00123900
1239  2884        BC 1F 24                  ADDA,R0       FLAG3                                                  00124000
1240  2887        CC 1F 24                  STRA,R0       FLAG3                                                  00124100
1241  288A        C2                        STRZ          R2                                                     00124200
1242  288B        C1                        STRZ          R1                                                     00124300
1243  288C  288C  0F 5F 07    LOOP81      LODA,R0       BYTE1,R3,-                                             00124400
1244  288F        CE 5F 45                  STRA,R0       BUF1,R2,-                                              00124500
1245  2892        5B 78                     BRNR,R3       LOOP81                                                 00124600
1246  2894        E5 0F                     COMI,R1       15                                                     00124700
1247  2895        3D 2F DA                  BSTA,P        DMPOBJ                                                 00124800
1248  2899  2899  0C 1F 3B    RET         LODA,R0       ENDFLG                                                 00124900
1249  289C        9C 25 B1                  BCFA,Z        ENDPAS                                                 00125000
```

```
LINE ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

     2B9F        1F 23 D0                             BCTA,UN        BLKBF3                                                                    00125100
                                          ************************************************************************************     00125200
     2BA2  2BA2  30 35 36 32              MES1        DATA           A'0562 ROF '                                                        00125300
                 20 52 4F 46
                 20
     2BAB        52 45 4C 42                          DATA           A'RELBMESSA'                                                        00125400
                 4D 45 53 53
                 41
     2BB4        20 54 4E 45                          DATA           A' TNEDISER '                                                       00125500
                 44 49 53 45
                 52 20
     2BBE        53 55 45 48                          DATA           A'SUEHTEMORP'                                                       00125600
                 54 45 4D 4F
                 52 50
     2BC8        0D 0A                                DATA           A[CR,LF]                                                            00125700
                                          ************************************************************************************     00125800
     2BCA  2BCA  20 3D 20 53              MES2        DATA           A' = SSAP'                                                          00125900
                 53 41 50
     2BD1        0D 0A 0A 0A                          DATA           A[CR,LF,LF,LF]                                                      00126000
                                          ************************************************************************************     00126100
     2BD5  2BD5  20 3D 20 53              MES3        DATA           A' = SRORRE '                                                       00126200
                 52 4F 52 52
                 45 20
     2BDF        52 45 4C 4D                          DATA           A'RELMESSA LATOT'                                                   00126300
                 45 53 53 41
                 20 4C 41 54
                 4F 54
     2BED        0D 0A 0A                             DATA           A[CR,LF,LF]                                                         00126400
                                          ************************************************************************************     00126500
     2BF0  2BF0  20 4E 4F 49              MES4          DATA           A' NOITACIFITNEDI'                                                00126600
                 54 41 43 49
                 46 49 54 4E
                 45 44 49
     2BFF        0D 0A                                  DATA           A[CR,LF]                                                          00126700
                                          ************************************************************************************     00126800
     2C01  2C01  20 45 4E 49              MES5          DATA           A' ENIL TA LLUF '                                                 00126900
                 4C 20 54 41
                 20 4C 4C 55
                 46 20
     2C0F        45 4C 42 41                            DATA           A'ELBAT LOBMYS'                                                   00127000
                 54 20 4C 4F
                 42 4D 59 53
     2C1B        0D 0A 0A                               DATA           A[CR,LF,LF]                                                       00127100
                                          ************************************************************************************     00127200
     2C1E  2C1E  20 44 45 53              MES6          DATA           A' DESU SLOBMYS'                                                  00127300
                 55 20 53 4C
                 4F 42 4D 59
                 53
     2C2B        0D 0A 0A                               DATA           A[CR,LF,LF]                                                       00127400
                                          ************************************************************************************     00127500
     2C2E  2C2E  52 45 54 43              MES7          DATA           A'RETCARAHC A EPYT'                                               00127600
                 41 52 41 48
                 43 20 41 20
                 45 50 59 54
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

1304  2C3E        20 44 4E 41                DATA    A' DNA HCNUP NO '                                  00127700
1305              20 48 43 4E
1306              55 50 20 4E
1307              4F 20
1308  2C4C        4E 52 55 54                DATA    A'NRUT'                                            00127800
1309  2C50        0D 0A                      DATA    A(CR,LF)                                           00127900
1310                                         ********************************************************** 00128000
1311  2C52  2C52  09 09 09 09       ROMDA1   DATA    H'09,09,09,09,0B,0B,0B,0B'                         00128100
1312              0B 0B 0B 0B
1313  2C5A        10 10 10 10                DATA    H'10,10,10,10,11,11,12,12'                         00128200
1314              11 11 12 12
1315  2C62        14 14 14 14                DATA    H'14,14,14,14,14,14,14,14'                         00128300
1316              14 14 14 14
1317  2C6A        14 16 1B 1B                DATA    H'14,16,1B,1B,1B,1B,1C,1C'                         00128400
1318              1B 1B 1C 1C
1319  2C72        20 2B 2B 2B                DATA    H'20,2B,2B,2B,2B,40,4B,4B'                         00128500
1320              2B 40 4B 4B
1321  2C7A        4B 4B 61 63                DATA    H'4B,4B,61,63,63,63,63,64'                         00128600
1322              63 63 63 64
1323  2C82        64 73 84 84                DATA    H'64,73,84,84,91,91,91,91'                         00128700
1324              91 91 91 91
1325  2C8A        91 94 94 9C                DATA    H'91,94,94,9C,9C,9D,9D,9D'                         00128800
1326              9C 9D 9D 9D
1327  2C92        9D 9D 9D 9D                DATA    H'9D,9D,9D,9D,9D,A3,A4,A4'                         00128900
1328              9D A3 A4 A4
1329  2C9A        BC BC BC D0                DATA    H'BC,BC,BC,D0,D0'                                  00129000
1330              D0
1331  2C9F        7C 2C 2B 20                DATA    H'7C,2C,2B,20,91,2A,08,9C'                         00129100
1332              91 2A 08 9C
1333  2CA7        84 80 A2 62                DATA    H'84,80,A2,62'                                     00129200
1334                                         ********************************************************** 00129300
1335  2CAB  2CAB  08 08 09 09       ROMDA2   DATA    H'08,08,09,09,88,88,89,89'                         00129400
1336              88 88 89 89
1337  2CB3        CC C0 E8 E9                DATA    H'CC,CD,E8,E9,24,25,64,65'                         00129500
1338              24 25 64 65
1339  2CBB        9C 9D CC C0                DATA    H'9C,9D,CC,CD,DC,DD,E8,E9'                         00129600
1340              DC DD E8 E9
1341  2CC3        F0 02 0A 0A                DATA    H'F0,02,0A,0A,0B,0B,26,27'                         00129700
1342              0B 0B 26 27
1343  2CCB        64 E4 E4 E5                DATA    H'64,E4,E4,E5,E5,59,E4,E4'                         00129800
1344              E5 59 E4 E4
1345  2CD3        E5 E5 20 C8                DATA    H'E5,E5,20,C8,C8,C9,C9,26'                         00129900
1346              C8 C9 C9 26
1347  2CDB        27 E0 26 27                DATA    H'27,E0,26,27,48,48,48,68'                         00130000
1348              48 48 48 68
1349  2CE3        68 98 A4 26                DATA    H'68,98,A4,26,27,20,24,25'                         00130100
1350              27 20 24 25
1351  2CEB        25 44 44 45                DATA    H'25,44,44,45,45,52,26,27'                         00130200
1352              45 52 26 27
1353  2CF3        A8 A8 A8 A7                DATA    H'A8,A8,A8,A7,A5'                                  00130300
1354              A5
1355  2CF8        8E 6A 88 68                DATA    H'8E,6A,88,68,66,8A,0E,06'                         00130400
1356              66 8A 0E 06
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

1357  2000        A8 00 68 45                    DATA        H'A8,00,68,45'                                00130500
1358                                             ************************************************************  00130600
1359  2004  2004  16 94 25 A8                    ROMDA3      DATA        H'16,94,25,A8,16,94,25,A8'        00130700
1360                16 94 25 A8
1361  2008        17 25 17 25                    DATA        H'17,25,17,25,17,25,17,25'                    00130800
1362                17 25 17 25
1363  2014        17 25 17 25                    DATA        H'17,25,17,25,17,25,17,25'                    00130900
1364                17 25 17 25
1365  2010        1B 0B 16 94                    DATA        H'1B,0B,16,94,25,A8,C9,59'                    00131000
1366                25 A8 C9 59
1367  2024        03 16 94 25                    DATA        H'03,16,94,25,A8,42,16,94'                    00131100
1368                A8 42 16 94
1369  2020        25 A8 CB 16                    DATA        H'25,A8,CB,16,94,25,5A,C2'                    00131200
1370                94 25 5A C2
1371  2034        52 02 C9 59                    DATA        H'52,02,C9,59,54,43,33,33'                    00131300
1372                54 43 33 33
1373  203C        53 03 03 C2                    DATA        H'53,03,03,C2,52,CB,16,25'                    00131400
1374                52 CB 16 25
1375  2044        A8 16 94 25                    DATA        H'A8,16,94,25,A8,04,C9,59'                    00131500
1376                A8 04 C9 59
1377  2040        33 43 54 2A                    DATA        H'33,43,54,2A,2A'                             00131600
1378                2A
1379  2051        01 01 C1 11                    DATA        H'01,01,01,11,01,01,E1,01'                    00131700
1380                01 01 E1 01
1381  2059        01 01 C1 21                    DATA        H'01,01,C1,21'                                00131800
1382                                             ************************************************************  00131900
1383  2050  2050  8C 84 88 80                    ROMDA4      DATA        H'8C,84,88,80,4C,44,48,40'        00132000
1384                4C 44 48 40
1385  2065        9C 98 1C 18                    DATA        H'9C,98,1C,18,FC,F8,DC,D8'                    00132100
1386                FC F8 DC D8
1387  2060        5C 58 BC B8                    DATA        H'5C,58,BC,B8,7C,78,3C,38'                    00132200
1388                7C 78 3C 38
1389  2075        BF 9F EC E4                    DATA        H'BF,9F,EC,E4,E8,E0,75,74'                    00132300
1390                E8 E0 75 74
1391  2070        94 2C 24 28                    DATA        H'94,2C,24,28,20,40,6C,64'                    00132400
1392                20 40 6C 64
1393  2085        68 60 10 0C                    DATA        H'68,60,10,0C,04,08,00,93'                    00132500
1394                04 08 00 93
1395  2080        92 C0 77 76                    DATA        H'92,C0,77,76,54,70,30,14'                    00132600
1396                54 70 30 14
1397  2095        34 D0 50 13                    DATA        H'34,D0,50,13,12,11,CC,C8'                    00132700
1398                12 11 CC C8
1399  2090        C0 AC A4 A8                    DATA        H'C0,AC,A4,A8,A0,F4,B5,B4'                    00132800
1400                A0 F4 B5 B4
1401  20A5        B0 F0 D4 BB                    DATA        H'B0,F0,D4,BB,9B'                             00132900
1402                9B
1403  20AA        00 01 02 03                    DATA        H'00,01,02,03,04,05,06,07'                    00133000
1404                04 05 06 07
1405  20B2        08 09 0A 0B                    DATA        H'08,09,0A,0B'                                00133100
1406                                             ************************************************************  00133200
1407                                             *                                                          * 00133300
1408                                             *           END OF PROMETHEUS ASSEMBLER FIRST HALF.        * 00133400
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

1409                          *                                                                      * 00133500
1410                          ************************************************************************  00133600
1411                          *                                                                      * 00133700
1412                          *              SPACE RESERVED FOR NOTES                                * 00133800
1413                          *                                                                      * 00133900
1414                          ************************************************************************  00134000
1415                          *                                                                        00134100
1416                          *                                                                        00134200
1417                          *                                                                        00134300
1418                          *                                                                        00134400
1419                          *                                                                        00134500
1420                          *                                                                        00134600
1421                          *                                                                        00134700
1422                          *                                                                        00134800
1423                          *                                                                        00134900
1424                          *                                                                        00135000
1425                          *                                                                        00135100
1426                          *                                                                        00135200
1427                          *                                                                        00135300
1428                          *                                                                        00135400
1429                          *                                                                        00135500
1430                          *                                                                        00135600
1431                          *                                                                        00135700
1432                          *                                                                        00135800
1433                          *                                                                        00135900
1434                          *                                                                        00136000
1435                          *                                                                        00136100
1436                          *                                                                        00136200
1437                          *                                                                        00136300
1438                          *                                                                        00136400
1439                          *                                                                        00136500
1440                          *                                                                        00136600
1441                          *                                                                        00136700
1442                          *                                                                        00136800
1443                          *                                                                        00136900
1444                          *                                                                        00137000
1445                          *                                                                        00137100
1446                          *                                                                        00137200
1447                          *                                                                        00137300
1448                          *                                                                        00137400
1449                          *                                                                        00137500
1450                          *                                                                        00137600
1451                          *                                                                        00137700
1452                          *                                                                        00137800
1453                          *                                                                        00137900
1454                          *                                                                        00138000
1455                          *                                                                        00138100
1456                          *                                                                        00138200
1457                          *                                                                        00138300
1458                          *                                                                        00138400
1459                          *                                                                        00138500
1460                          *                                                                        00138600
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

1461                                *                                                00138700
1462                                *                                                00138800
1463                                *                                                00138900
1464                                *                                                00139000
1465                                *                                                00139100
1466                                *                                                00139200
1467                                *                                                00139300
1468                                *                                                00139400
1469                                *                                                00139500
1470                                *                                                00139600
1471                                *                                                00139700
1472                                *                                                00139800
1473                                *                                                00139900
1474                                *                                                00140000
1475                                *                                                00140100
1476                                *                                                00140200
1477                                *                                                00140300
1478                                *                                                00140400
1479                                *                                                00140500
1480                                *                                                00140600
1481                                *                                                00140700
1482                                *                                                00140800
1483                                *                                                00140900
1484                                *                                                00141000
1485                                *                                                00141100
1486                                *                                                00141200
1487                                *                                                00141300
1488                                *                                                00141400
1489                                *                                                00141500
1490                                *                                                00141600
1491                                *                                                00141700
1492                                *                                                00141800
1493                                *                                                00141900
1494                                *                                                00142000
1495                                *                                                00142100
1496                                *                                                00142200
1497                                *                                                00142300
1498                                *                                                00142400
1499                                *                                                00142500
1500                                *                                                00142600
1501                                *                                                00142700
1502                                *                                                00142800
1503                                *                                                00142900
1504                                *                                                00143000
1505                                *                                                00143100
1506                                *                                                00143200
1507                                *                                                00143300
1508                                *                                                00143400
1509                                *                                                00143500
1510                                *                                                00143600
1511                                *                                                00143700
1512                                *                                                00143800
```

LINE ADDR LABL B1 B2 B3 B4 ERROR SOURCE

```
1513                                    *                                                                00143900
1514                                    *                                                                00144000
1515                                    *                                                                00144100
1516                                    *                                                                00144200
1517                                    *                                                                00144300
1518                                    *                                                                00144400
1519                                    *                                                                00144500
1520                                    *                                                                00144600
1521                                    *                                                                00144700
1522                                    *                                                                00144800
1523                                    *                                                                00144900
1524                                    *                                                                00145000
1525                                    *                                                                00145100
1526                                    *                                                                00145200
1527                                    *                                                                00145300
1528                                    *                                                                00145400
1529                                    *                                                                00145500
1530                                    *                                                                00145600
1531                                    *                                                                00145700
1532                                    *                                                                00145800
1533                                    *                                                                00145900
1534                                    *                                                                00146000
1535                                    *                                                                00146100
1536                                    *                                                                00146200
1537                                    *                                                                00146300
1538                                    *                                                                00146400
1539                                    *                                                                00146500
1540                                    *                                                                00146600
1541                                    *                                                                00146700
1542                                    *                                                                00146800
1543                                    *                                                                00146900
1544                                    *                                                                00147000
1545                                    *                                                                00147100
1546                                    *                                                                00147200
1547                                    *                                                                00147300
1548                                    *                                                                00147400
1549                                    *                                                                00147500
1550                                    *                                                                00147600
1551                                    *                                                                00147700
1552                                    *                                                                00147800
1553                                    *                                                                00147900
1554                                    *                                                                00148000
1555                                    *                                                                00148100
1556                                    *                                                                00148200
1557                                    *                                                                00148300
1558                                    *                                                                00148400
1559                                    *                                                                00148500
1560                                    *                                                                00148600
1561                                    *                                                                00148700
1562                                    *                                                                00148800
1563                                    *                                                                00148900
1564                                    *                                                                00149000
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

1565                                *                                                                    00149100
1566                                *                                                                    00149200
1567                                *                                                                    00149300
1568                                *                                                                    00149400
1569                                *                                                                    00149500
1570                                *                                                                    00149600
1571                                *                                                                    00149700
1572                                *                                                                    00149800
1573                                *                                                                    00149900
1574                                *                                                                    00150000
1575                                *                                                                    00150100
1576                                *                                                                    00150200
1577                                *                                                                    00150300
1578                                *                                                                    00150400
1579                                *                                                                    00150500
1580                                *                                                                    00150600
1581                                *                                                                    00150700
1582                                *                                                                    00150800
1583                                *                                                                    00150900
1584                                *                                                                    00151000
1585                                *                                                                    00151100
1586                                *                                                                    00151200
1587                                *                                                                    00151300
1588                                *                                                                    00151400
1589                                *                                                                    00151500
1590                                *                                                                    00151600
1591                                *                                                                    00151700
1592                                *                                                                    00151800
1593                                *                                                                    00151900
1594                                ************************************************************************ 00152000
1595                                *                                                                  * 00152100
1596                                *            BEGIN OF PROMETHEUS ASSEMBLER SECOND HALF             * 00152200
1597                                *                                                                  * 00152300
1598                                ************************************************************************ 00152400
1599                                          ORG             H'2E00'                                    00152500
1600                                ************************************************************************ 00152600
1601  2E00  2E00  04 0D            CRLF      LODI,R0         A'CR'                                      00152700
1602  2E02        3B 35                       BSTR,UN           WRCHAR                                   00152800
1603  2E04        3B 27                       BSTR,UN           DELAY                                    00152900
1604  2E06  2E06  04 0A            LF        LODI,R0           A'LF'                                    00153000
1605  2E08        3B 2F                       BSTR,UN           WRCHAR                                   00153100
1606  2E0A        1B 21                       BCTR,UN           DELAY                                    00153200
1607                                ************************************************************************ 00153300
1608  2E0C  2E0C  04 C0            LEESTT    LODI,R0           H'C0'                                    00153400
1609  2E0E        B0                          WRTC,R0                                                    00153500
1610  2E0F  2E0F  77 10            LEESCH    PPSL              RS                                       00153600
1611  2E11        05 00                       LODI,R1           0                                        00153700
1612  2E13        06 08                       LODI,R2           8                                        00153800
1613  2E15  2E15  12               LOOP20    SPSU                                                       00153900
1614  2E16        1A 70                       BCTR,N            LOOP20                                   00154000
1615  2E18        B1                          WRTC,R1                                                    00154100
1616  2E19        3B 17                       BSTR,UN           DEL3                                     00154200
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

1617  2E18  2E1B  3B 10             LOOP21      BSTR,UN     DELAY                00154300
1618  2E1D        12                            SPSU                             00154400
1619  2E1E        44 80                         ANDI,R0     H'80'                00154500
1620  2E20        51                            RRR,R1                           00154600
1621  2E21        61                            IORZ        R1                   00154700
1622  2E22        C1                            STRZ        R1                   00154800
1623  2E23        FA 76                         BDRR,R2     LOOP21               00154900
1624  2E25        3B 06                         BSTR,UN     DELAY                00155000
1625  2E27        45 7F                         ANDI,R1     H'7F'                00155100
1626  2E29        01                            LODZ        R1                   00155200
1627  2E2A        75 18                         CPSL        RS+WC                00155300
1628  2E2C        17                            RETC,UN                          00155400
1629                ********************************************************** 00155500
1630  2E2D  2E2D  20             DELAY       EORZ        R0                   00155600
1631  2E2E  2E2E  F8 7E          DEL1        BDRR,R0     $                    00155700
1632  2E30  2E30  F8 7E          DEL2        BDRR,R0     $                    00155800
1633  2E32  2E32  F8 7E          DEL3        BDRR,R0     $                    00155900
1634  2E34        04 E5                         LODI,R0     H'E5'                00156000
1635  2E35  2E36  F8 7E          DEL4        BDRR,R0     $                    00156100
1636  2E38        17                            RETC,UN                          00156200
1637                ********************************************************** 00156300
1638  2E39  2E39  77 10          WRCHAR      PPSL        RS                   00156400
1639  2E3B        76 40                         PPSU        FLAG                 00156500
1640  2E3D        C2                            STRZ        R2                   00156600
1641  2E3E        C3                            STRZ        R3                   00156700
1642  2E3F        05 08                         LODI,R1     8                    00156800
1643  2E41        3B 6A                         BSTR,UN     DELAY                00156900
1644  2E43        3B 68                         BSTR,UN     DELAY                00157000
1645  2E45        74 40                         CPSU        FLAG                 00157100
1646  2E47  2E47  3B 64          LOOP22      BSTR,UN     DELAY                00157200
1647  2E49        52                            RRR,R2                           00157300
1648  2E4A        1A 04                         BCTR,N      EENBIT               00157400
1649  2E4C        74 40                         CPSU        FLAG                 00157500
1650  2E4E        1B 02                         BCTR,UN     NULBIT               00157600
1651  2E50  2E50  76 40          EENBIT      PPSU        FLAG                 00157700
1652  2E52  2E52  F9 73          NULBIT      BDRR,R1     LOOP22               00157800
1653  2E54        3B 57                         BSTR,UN     DELAY                00157900
1654  2E56        76 40                         PPSU        FLAG                 00158000
1655  2E58        03                            LODZ        R3                   00158100
1656  2E59        75 10                         CPSL        RS                   00158200
1657  2E5B        17                            RETC,UN                          00158300
1658                ********************************************************** 00158400
1659  2E5C  2E5C  07 01          WRT1BL      LODI,R3     1                    00158500
1660  2E5E  2E5E  04 20          WRTBL       LODI,R0     A' '                 00158600
1661  2E60        3B 57                         BSTR,UN     WRCHAR               00158700
1662  2E62        FB 7A                         BDRR,P3     WRTBL                00158800
1663  2E64        17                            RETC,UN                          00158900
1664                ********************************************************** 00159000
1665  2E65  2E65  CD 1F FF          WHEX        STRA,R1     CHSTOR               00159100
1666  2E68        3B 27                         BSTR,UN     TEST                 00159200
1667  2E6A        51                            RRR,R1                           00159300
1668  2E6B        51                            RRR,R1                           00159400
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

1669  2E6C        51                          RRR,R1                                  00159500
1670  2E6D        51                          RRR,R1                                  00159600
1671  2E6E        45 0F                       ANDI,R1         15                      00159700
1672  2E70        0D 6E 81                    LODA,R0         ASCII,R1                00159800
1673  2E73        3F 2E 79                    BSTA,UN         WRCHAR                  00159900
1674  2E76        0D 1F FF                    LODA,R1         CHSTOR                  00160000
1675  2E79        45 0F                       ANDI,R1         15                      00160100
1676  2E7B        0D 6E 81                    LODA,R0         ASCII,R1                00160200
1677  2E7E        1F 2E 79                    BCTA,UN         WRCHAR                  00160300
1678                                  ********************************************************************** 00160400
1679  2E81  2E81  30 31 32 33        ASCII       DATA            A'0123456789ABCDEF'     00160500
1680              34 35 36 37
1681              38 39 41 42
1682              43 44 45 46
1683                                  ********************************************************************** 00160600
1684  2E91  2E91  01                  TEST        LODZ            R1                      00160700
1685  2E92        2C 1F FE                    EORA,R0         CHECK                   00160800
1686  2E95        00                          RRL,R0                                  00160900
1687  2E96        CC 1F FE                    STRA,R0         CHECK                   00161000
1688  2E99        17                          RETC,UN                                 00161100
1689                                  ********************************************************************** 00161200
1690  2E9A  2E9A  CF 1F 77            LABEL       STRA,R3         REG3A               00161300
1691  2E9D        07 04                       LODI,R3         4                       00161400
1692  2E9F        20                          EORZ            R0                      00161500
1693  2EA0        CC 1F 29                    STRA,R0         CRTL                    00161600
1694  2EA3  2EA3  0F 5F 2A            LOOCH       LODA,R0         BUF8,R3,-           00161700
1695  2EA6        E4 20                       COMI,R0         A' '                    00161800
1696  2EA8        98 03                       BCFR,EQ         ZOEK                    00161900
1697  2EAA        20                          EORZ            R0                      00162000
1698  2EAB        1B 08                       BCTR,UN         STOCHL                  00162100
1699                                  ********************************************************************** 00162200
1700  2EAD  2EAD  A4 10               ZOEK        SUBI,R0         16                  00162300
1701  2EAF        E4 30                       COMI,R0         H'30'                   00162400
1702  2EB1        1A 02                       BCTR,N          STOCHL                  00162500
1703  2EB3        A4 30                       SUBI,R0         H'30'                   00162600
1704  2EB5  2EB5  CF 7F 2A            STOCHL      STRA,R0         BUF8,R3             00162700
1705  2EB8        5B 69                       BRNR,R3         LOOCH                   00162800
1706  2EBA        0D 1F 2A                    LODA,R1         BUF8                    00162900
1707  2EBD        0C 1F 2B                    LODA,R0         BUF8+1                  00163000
1708  2EC0        D1                          RRL,R1                                  00163100
1709  2EC1        01                          RRL,R1                                  00163200
1710  2EC2        50                          RRR,R0                                  00163300
1711  2EC3        50                          RRR,R0                                  00163400
1712  2EC4        50                          RRR,R0                                  00163500
1713  2EC5        50                          RRR,R0                                  00163600
1714  2EC6        C2                          STRZ            R2                      00163700
1715  2EC7        44 03                       ANDI,R0         3                       00163800
1716  2EC9        81                          ADDZ            R1                      00163900
1717  2ECA        1A 10                       BCTR,N          CRTL1A                  00164000
1718  2ECC        CC 1F 2E                    STRA,R0         BUF6                    00164100
1719  2ECF        46 F0                       ANDI,R2         H'F0'                   00164200
1720  2ED1        0D 1F 2C                    LODA,R1         BUF8+2                  00164300
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

1721  2E04        51                          RRR,R1                                  00164400
1722  2E05        51                          RRR,R1                                  00164500
1723  2E06        01                          LODZ        R1                          00164600
1724  2E07        44 10                       ANDI,R0     16                          00164700
1725  2E09        82                          ADDZ        R2                          00164800
1726  2E0A        CC 1F 2F                    STRA,R0     BUF6+1                      00164900
1727  2E0D        45 C0                       ANDI,R1     H'C0'                       00165000
1728  2E0F        8D 1F 2D                    ADDA,R1     BUF6+0'-1'                  00165100
1729  2E12        CD 1F 30                    STRA,R1     BUF6+2                      00165200
1730  2E15        0F 1F 77                    LODA,R3     REG3A                       00165300
1731  2E18        17                          RETC,UN                                 00165400
1732                          ************************************************************ 00165500
1733  2E19  2E19  05 01                CRTL1A  LODI,R1     1                           00165600
1734  2E1B        CD 1F 29                    STRA,R1     CRTL                        00165700
1735  2E1E        0F 1F 77                    LODA,R3     REG3A                       00165800
1736  2E21        17                          RETC,UN                                 00165900
1737                          ************************************************************ 00166000
1738  2E22  2E22  06 00                FILAB   LODI,R2     0                           00166100
1739  2E24        CF 1F 77                    STRA,R3     REG3A                       00166200
1740  2E27        07 00                       LODI,R3     0                           00166300
1741  2E29        04 37                       LODI,R0     H'37'                       00166400
1742  2E2B        CC 1F 43                    STRA,R0     POINT4                      00166500
1743  2E2E        04 9C                       LODI,R0     H'9C'                       00166600
1744  2E30        CC 1F 44                    STRA,R0     POINT4+1                    00166700
1745  2E33        77 08                       PPSL        WC                          00166800
1746  2E35        18 11                       BCTR,UN     LOO1                        00166900
1747                          ************************************************************ 00167000
1748  2E37  2E37  75 01                VLGLAB  CPSL        CAR                         00167100
1749  2E39        0C 1F 44                    LODA,R0     POINT4+1                    00167200
1750  2E3C        81                          ADDZ        R1                          00167300
1751  2E3D        CC 1F 44                    STRA,R0     POINT4+1                    00167400
1752  2E40        0C 1F 43                    LODA,R0     POINT4                      00167500
1753  2E43        84 00                       ADDI,R0     0                           00167600
1754  2E45        CC 1F 43                    STRA,R0     POINT4                      00167700
1755  2E48  2E48  05 00                LOO1    LODI,R1     0                           00167800
1756  2E4A        0D FF 43                    LODA,R0    *POINT4,R1                   00167900
1757  2E4D        44 7F                       ANDI,R0     H'7F'                       00168000
1758  2E4F        1B 03                       BCTR,UN     NXT                         00168100
1759                          ************************************************************ 00168200
1760  2E51  2E51  0D FF 43          LOAO      LODA,R0    *POINT4,R1                   00168300
1761  2E54  2E54  E4 7B             NXT       COMI,R0     H'7B'                       00168400
1762  2E56        18 21                        BCTR,Z      NTFND                      00168500
1763  2E58        ED 3F 2D                     COMA,R0     BUF6+0'-1',R1,+            00168600
1764  2E5B        18 12                        BCTR,Z      ENDLAB                     00168700
1765  2E5D        0B 02                        BIRR,R3     NXTCHR                     00168800
1766  2E5F        0A 00                        BIRR,R2     NXTCHR                     00168900
1767  2E61  2E61  EE 1F 7F          NXTCHR    COMA,R2     LSTLAB                     00169000
1768  2E64        98 05                        BCFR,Z      LAB07                      00169100
1769  2E66        EF 1F 40                     COMA,R3     LSTLAB+1                   00169200
1770  2E69        18 0E                        BCTR,Z      NTFND                      00169300
1771  2E6B  2E6B  05 05             LAB07     LODI,R1     5                          00169400
1772  2E6D        18 48                        BCTR,UN     VLGLAB                     00169500
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

1773                          ********************************************************************************  00169600
1774  2F3F  2F3F  E5 03       ENDLAB          COMI,R1         3                                                 00169700
1775  2F41        98 5E                       BCFR,EQ         LOAD                                              00169800
1776  2F43  2F43  75 03       RETULA          CPSL            WC                                                00169900
1777  2F45        0F 1F 77                    LODA,R3         REG3A                                             00170000
1778  2F48        17                          RETC,UN                                                           00170100
1779                          ********************************************************************************  00170200
1780  2F49  2F49  04 FF       NTFND           LODI,R0         255                                               00170300
1781  2F4B        CC 1F 43                    STRA,R0         POINT4                                            00170400
1782  2F4E        CC 1F 44                    STRA,R0         POINT4+1                                          00170500
1783  2F51        18 70                       BCTR,UN         RETULA                                            00170600
1784                          ********************************************************************************  00170700
1785  2F53  2F53  07 00       ENTTAP          LODI,R3         0                                                 00170800
1786  2F55  2F55  0D 1F 23    GETCH           LODA,R1         PRFLAG                                            00170900
1787  2F58        1E 2F BA                    BCTA,N          TTYRED                                            00171000
1788  2F5B        3F 20 00                    BSTA,UN         H'2000'                                           00171100
1789  2F5E  2F5E  E4 18       CNTRED          COMI,R0         H'18'                                             00171200
1790  2F60        18 71                       BCTR,Z          ENTTAP                                            00171300
1791  2F62        E4 5F                       COMI,R0         H'5F'                                             00171400
1792  2F64        18 38                       BCTR,Z          NXGET                                             00171500
1793  2F66        E4 00                       COMI,R0         H'00'                                             00171600
1794  2F68        18 30                       BCTR,Z          NULBF5                                            00171700
1795  2F6A        E4 0A                       COMI,R0         H'0A'                                             00171800
1796  2F6C        1C 2F B6                    BCTA,Z          SETMSB                                            00171900
1797  2F6F        E4 20                       COMI,R0         A' '                                              00172000
1798  2F71        1A 62                       BCTR,N          GETCH                                             00172100
1799  2F73        E4 5A                       COMI,R0         A'Z'                                              00172200
1800  2F75        99 06                       BCFR,P          CHAR                                              00172300
1801  2F77        44 5F                       ANDI,R0         H'5F'                                             00172400
1802  2F79        E4 5A                       COMI,R0         A'Z'                                              00172500
1803  2F7B        19 58                       BCTR,P          GETCH                                             00172600
1804  2F7D  2F7D  E4 30       CHAR            COMI,R0         A'0'                                              00172700
1805  2F7F        1A 0A                       BCTR,N          CONTR1                                            00172800
1806  2F81        E4 41                       COMI,R0         A'A'                                              00172900
1807  2F83        9A 04                       BCFR,N          MSB1                                              00173000
1808  2F85        E4 39                       COMI,R0         A'9'                                              00173100
1809  2F87        19 02                       BCTR,P          CONTR1                                            00173200
1810  2F89  2F89  64 80       MSB1            IORI,R0         H'80'                                             00173300
1811  2F8B  2F8B  CF 3F 7A    CONTR1          STRA,R0         BUF5+0'-1',R3,+                                   00173400
1812  2F8E        E7 47                       COMI,R3         71                                                00173500
1813  2F90        99 43                       BCFR,P          GETCH                                             00173600
1814  2F92  2F92  20          CLBF5           EORZ            R0                                                00173700
1815  2F93  2F93  CF 1F C3    CLBUF5          STRA,R3         CHACNT                                            00173800
1816  2F96  2F96  E7 47       RETBF5          COMI,R3         71                                                00173900
1817  2F98        15                          RETC,P                                                            00174000
1818  2F99        CF 3F 7A                    STRA,R0         BUF5+0'-1',R3,+                                   00174100
1819  2F9C        1B 78                       BCTR,UN         RETBF5                                            00174200
1820                          ********************************************************************************  00174300
1821  2F9E  2F9E  E7 00       NXGET           COMI,R3         0                                                 00174400
1822  2FA0        18 02                       BCTR,EQ         BRGET                                             00174500
1823  2FA2        A7 01                       SUBI,R3         1                                                 00174600
1824  2FA4  2FA4  1F 2F 55    BRGET           BCTA,UN         GETCH                                             00174700
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

1825                          ********************************************************************************  00174800
1826  2FA7  2FA7  5B 02       NUL8F5          BRNR,R3         CLWRT                                             00174900
1827  2FA9        18 79                       BCTR,UN         BRGET                                             00175000
1828                          ********************************************************************************  00175100
1829  2FAB  2FAB  20          CLWRT           EORZ            R0                                                00175200
1830  2FAC        CF 3F 7A                    STRA,R0         BUF5+D'-1',R3,+                                   00175300
1831  2FAF        65 00                       IORI,R1         0                                                 00175400
1832  2FB1        3E 2E 39                    BSTA,N          WRCHAR                                            00175500 <<<<<<
1833  2FB4        18 5D                       BCTR,UN         CLBUF5                                            00175600
1834                          ********************************************************************************  00175700
1835  2FB6  2FB6  5B 53       SETMSB          BRNR,R3         CONTR1                                            00175800
1836  2FB8        18 6A                       BCTR,UN         BRGET                                             00175900
1837                          ********************************************************************************  00176000
1838  2FBA  2FBA  3F 2E 0C    TTYRED          BSTA,UN         LEESTT                                            00176100
1839  2FBD        1F 2F 5E                    BCTA,UN         CNTRED                                            00176200
1840                          ********************************************************************************  00176300
1841  2FC0  2FC0  0F 1F 75    ENDREG          LODA,R3         CHARNR                                            00176400
1842  2FC3  2FC3  0F 3F 7A    LOOP23          LODA,R0         BUF5+D'-1',R3,+                                   00176500
1843  2FC5        18 0E                       BCTR,Z          REGEND                                            00176600
1844  2FC8        E4 20                       COMI,R0         A' '                                              00176700
1845  2FCA        18 77                       BCTR,EQ         LOOP23                                            00176800
1846  2FCC        F8 00                       BDRR,R3         FOUTIN                                            00176900
1847  2FCE  2FCE  20          FOUTIN          EORZ            R0                                                00177000
1848  2FCF  2FCF  CF 1F 75    RETIN           STRA,R3         CHARNR                                            00177100
1849  2FD2        CC 1F 29                    STRA,R0         CRTL                                              00177200
1850  2FD5        17                          RETC,UN                                                           00177300
1851                          ********************************************************************************  00177400
1852  2FD6  2FD6  04 01       REGEND          LODI,R0         1                                                 00177500
1853  2FD8        18 75                       BCTR,UN         RETIN                                             00177600
1854                          ********************************************************************************  00177700
1855  2FDA  2FDA  0C 1F 7C    DMPOBJ          LODA,R0         PASS                                              00177800
1856  2FDD        44 7F                       ANDI,R0         H'7F'                                             00177900
1857  2FDF        E4 03                       COMI,R0         3                                                 00178000
1858  2FE1        16                          RETC,N                                                            00178100
1859  2FE2        15                          RETC,P                                                            00178200
1860  2FE3        0E 1F 24                    LODA,R2         FLAG3                                             00178300
1861  2FE6        14                          RETC,Z                                                            00178400
1862  2FE7        19 04                       BCTR,P          GR10                                              00178500
1863  2FE9        06 00                       LODI,R2         0                                                 00178600
1864  2FEB        18 09                       BCTR,UN         DUMP                                              00178700
1865                          ********************************************************************  00178800
1866  2FED  2FED  E6 10       GR10            COMI,R2         16                                                00178900
1867  2FEF        1D 30 57                    BCTA,P          SUB10                                             00179000
1868  2FF2        20                          EORZ            R0                                                00179100
1869  2FF3        CC 1F 24                    STRA,R0         FLAG3                                             00179200
1870  2FF6  2FF6  CE 1F FD    DUMP            STRA,R2         NRBYTS                                            00179300
1871  2FF9        3F 30 09                    BSTA,UN         PR8NUL                                            00179400
1872  2FFC        3F 2E 00                    BSTA,UN         CRLF                                              00179500
1873  2FFF        20                          EORZ            R0                                                00179600
1874  3000        CC 1F FE                    STRA,R0         CHECK                                             00179700
1875  3003        04 3A                       LODI,R0         A':'                                              00179800
1876  3005        3F 2E 79                    BSTA,UN         WRCHAR                                            00179900
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

1877  3008        0D 1F 74                    LODA,R1     STADD                          00180000
1878  300B        3F 2E 65                    BSTA,UN     WHEX                           00180100
1879  300E        0D 1F 75                    LODA,R1     STADD+1                        00180200
1880  3011        3F 2E 65                    BSTA,UN     WHEX                           00180300
1881  3014        0D 1F 74                    LODA,R1     STADD                          00180400
1882  3017        0E 1F 75                    LODA,R2     STADD+1                        00180500
1883  301A        0C 1F FD                    LODA,R0     NRBYTS                         00180600
1884  301D        3F 34 A0                    BSTA,UN     ADNR                           00180700
1885  3020        CD 1F 74                    STRA,R1     STADD                          00180800
1886  3023        CE 1F 75                    STRA,R2     STADD+1                        00180900
1887  3026        0D 1F FD                    LODA,R1     NRBYTS                         00181000
1888  3029        3F 2E 65                    BSTA,UN     WHEX                           00181100
1889  302C        0D 1F FE                    LODA,R1     CHECK                          00181200
1890  302F        3F 2E 65                    BSTA,UN     WHEX                           00181300
1891  3032        0C 1F 74                    LODA,R0     FLAG3                          00181400
1892  3035        16                          RETC,N                                     00181500
1893  3036        06 00                       LODI,R2     0                              00181600
1894  3038  3038  0E 3F 44          LOOPDP     LODA,R0     BUF1+0'-1',R2,+                00181700
1895  303B        C1                          STRZ        R1                             00181800
1896  303C        3F 2E 65                    BSTA,UN     WHEX                           00181900
1897  303F        EE 1F FD                    COMA,R2     NRBYTS                         00182000
1898  3042        1A 74                       BCTR,N      LOOPDP                         00182100
1899  3044        0D 1F FE                    LODA,R1     CHECK                          00182200
1900  3047        3F 2E 65                    BSTA,UN     WHEX                           00182300
1901  304A        0E 1F 74                    LODA,R2     FLAG3                          00182400
1902  304D        14                          RETC,Z                                     00182500
1903  304E  304E  0E 7F 54          LOOP24     LODA,R0     BUF1+15,R2                     00182600
1904  3051        CE 7F 44                    STRA,R0     BUF1+0'-1',R2                  00182700
1905  3054        FA 78                       BDRR,R2     LOOP24                         00182800
1906  3056        17                          RETC,UN                                    00182900
1907                          ************************************************************ 00183000
1908  3057  3057  A6 10          SUB10      SUBI,R2     16                             00183100
1909  3059        CE 1F 74                    STRA,R2     FLAG3                          00183200
1910  305C        06 10                       LODI,R2     16                             00183300
1911  305E        1F 2F F6                    BCTA,UN     DUMP                           00183400
1912                          ************************************************************ 00183500
1913  3061  3061  0D 1F 43          PT4PL2     LODA,R1     POINT4                         00183600
1914  3064        0E 1F 44                    LODA,R2     POINT4+1                       00183700
1915  3067        86 02                       ADDI,R2     2                              00183800
1916  3069        77 08                       PPSL        WC                             00183900
1917  306B        85 00                       ADDI,R1     0                              00184000
1918  306D        75 08                       CPSL        WC                             00184100
1919  306F        CD 1F 43                    STRA,R1     POINT4                         00184200
1920  3072        CE 1F 44                    STRA,R2     POINT4+1                       00184300
1921  3075        17                          RETC,UN                                    00184400
1922                          ************************************************************ 00184500
1923  3076  3076  0C 1F 73          INCERR     LODA,R0     NRERR                          00184600
1924  3079        08 00                       BIRR,R0     INCNRE                         00184700
1925  307B  307B  CC 1F 73          INCNRE     STRA,R0     NRERR                          00184800
1926  307E        17                          RETC,UN                                    00184900
1927                          ************************************************************ 00185000
1928  307F  307F  0F 1F 75          INCCNT      LODA,R3     CHARNR                        00185100
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

1929  3082        0B 00                     BIRR,R3     INCNRC                          00185200
1930  3084  3084  CF 1F 75          INCNRC  STRA,R3     CHARNR                          00185300
1931  3087        17                        RETC,UN                                     00185400
1932              ********************************************************************* 00185500
1933  3088  3088  0C 1F 78          INCLIN  LODA,R0     LINENR+1                        00185600
1934  308B        00 1F 77                  LODA,R1     LINENR                          00185700
1935  308E        08 05                     BIRR,R0     GCRLN                           00185800
1936  3090        09 00                     BIRR,R1     CARLIN                          00185900
1937  3092  3092  CD 1F 77          CARLIN  STRA,R1     LINENR                          00186000
1938  3095  3095  CC 1F 78          GCRLN   STRA,R0     LINENR+1                        00186100
1939  3098        17                        RETC,UN                                     00186200
1940              ********************************************************************* 00186300
1941  3099  3099  07 08             PRBNUL  LODI,R3     8                               00186400
1942  309B  309B  04 00             LOOP25  LODI,R0     0                               00186500
1943  309D        3F 2E 79                  BSTA,UN     WRCHAR                          00186600
1944  30A0        FB 79                     BORR,R3     LOOP25                          00186700
1945  30A2        17                        RETC,UN                                     00186800
1946              ********************************************************************* 00186900
1947  30A3  30A3  05 05             HEADER  LODI,R1     5                               00187000
1948  30A5  30A5  3B 72             LOOP26  BSTR,UN     PRBNUL                          00187100
1949  30A7        F9 7C                     BORR,R1     LOOP26                          00187200
1950  30A9        17                        RETC,UN                                     00187300
1951              ********************************************************************* 00187400
1952  30AA  30AA  0E 1F 76          NEWPAG  LODA,R2     PAGCNT                          00187500
1953  30AD        0A 00                     BIRR,R2     STRP                            00187600
1954  30AF  30AF  CE 1F 76          STRP    STRA,R2     PAGCNT                          00187700
1955  30B2        04 34                     LODI,R0     52                              00187800
1956  30B4        CC 1F 74                  STRA,R0     LINPAG                          00187900
1957  30B7        0C 1F 7C                  LODA,R0     PASS                            00188000
1958  30BA        44 BF                     ANDI,R0     H'BF'                           00188100
1959  30BC        E4 02                     COMI,R0     2                               00188200
1960  30BE        16                        RETC,N                                      00188300
1961  30BF        15                        RETC,P                                      00188400
1962  30C0        3F 2E 00                  BSTA,UN     CRLF                            00188500
1963  30C3        07 04                     LODI,R3     4                               00188600
1964  30C5  30C5  3F 2E 96          LOOP27  BSTA,UN     LF                              00188700
1965  30C8        FB 7B                     BORR,R3     LOOP27                          00188800
1966  30CA        07 FF                     LODI,R3     255                             00188900
1967  30CC  30CC  0F 31 0C          LOOP28  LODA,R0     MES8,R3,+                       00189000
1968  30CF        3F 2E 79                  BSTA,UN     WRCHAR                          00189100
1969  30D2        E7 17                     COMI,R3     23                              00189200
1970  30D4        98 76                     BCFR,Z      LOOP28                          00189300
1971  30D6        07 28                     LODI,R3     40                              00189400
1972  30D8  30D8  0F 5F 45          LOOP29  LODA,R0     BUF1,R3,-                       00189500
1973  30DB        3F 2E 79                  BSTA,UN     WRCHAR                          00189600
1974  30DE        5B 78                     BRNR,R3     LOOP29                          00189700
1975  30E0        07 FF                     LODI,R3     255                             00189800
1976  30E2  30E2  0F 31 23          LOOP30  LODA,R0     MES9,R3,+                       00189900
1977  30E5        3F 2E 79                  BSTA,UN     WRCHAR                          00190000
1978  30E8        E7 05                     COMI,R3     5                               00190100
1979  30EA        98 76                     BCFR,Z      LOOP30                          00190200
1980  30EC        05 00                     LODI,R1     0                               00190300
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

1981  30EE        02                          LODZ        R2                          00190400
1982  30EF        3F 31 4B                    BSTA,UN     BINBCD                      00190500
1983  30F2        07 02                       LODI,R3     2                           00190600
1984  30F4        3F 31 A1                    BSTA,UN     PRBCD                       00190700
1985  30F7        3F 2E D0                    BSTA,UN     CRLF                        00190800
1986  30FA        3F 2E 06                    BSTA,UN     LF                          00190900
1987  30FD        07 FF                       LODI,R3     255                         00191000
1988  30FF  30FF  0F 31 29            LOOP31  LODA,R0     MES10,R3,+                  00191100
1989  3102        3F 2E 79                    BSTA,UN     WRCHAR                      00191200
1990  3105        E7 21                       COMI,R3     33                          00191300
1991  3107        98 76                       BCFR,Z      LOOP31                      00191400
1992  3109        1F 2E D0                    BCTA,UN     CRLF                        00191500
1993                                  ********************************************************************** 00191600
1994  310C  310C  20 32 36 35        MES8    DATA        A' 2650 ASSEMBLER'          00191700
1995              30 20 41 53
1996              53 45 4D 42
1997              4C 45 52
1998  3118        20 56 45 52                 DATA        A' VER 1  '                 00191800
1999              20 31 20 20
2000  3123  3123  20 50 41 47        MES9    DATA        A' PAGE '                   00191900
2001              45 20
2002  3129  3129  4C 49 4E 45        MES10   DATA        A'LINE ADDR B1 B2'          00192000
2003              20 41 44 44
2004              52 20 42 31
2005              20 42 32
2006  3138        20 42 33 20                 DATA        A' B3 B4 ERROR '            00192100
2007              42 34 20 45
2008              52 52 4F 52
2009              20
2010  3145        53 4F 55 52                 DATA        A'SOURCE'                   00192200
2011              43 45
2012                                  ********************************************************************** 00192300
2013  314B  314B  CE 1F FA           BINBCD  STRA,R2     REG2                        00192400
2014  314E        CF 1F FB                    STRA,R3     REG3                        00192500
2015  3151        77 08                       PPSL        WC                          00192600
2016  3153        45 7F                       ANDI,R1     H'7F'                       00192700
2017  3155        07 08                       LODI,R3     8                           00192800
2018  3157  3157  06 FF            LOOP33  LODI,R2     255                         00192900
2019  3159  3159  77 01            LOOP34  PPSL        CAR                         00193000
2020  315B        DA 00                       BIRR,R2     INCR2                       00193100
2021  315D  315D  AF 71 98           INCR2   SUBA,R0     BASE+D'-1',R3               00193200
2022  3160        CC 1F FC                    STRA,R0     DATAS                       00193300
2023  3163        01                          LODZ        R1                          00193400
2024  3164        AF 71 97                    SUBA,R0     BASE+D'-2',R3               00193500
2025  3167        C1                          STRZ        R1                          00193600
2026  3168        0C 1F FC                    LODA,R0     DATAS                       00193700
2027  316B        65 00                       IORI,R1     0                           00193800
2028  316D        9A 6A                       BCFR,N      LOOP34                      00193900
2029  316F        75 01                       CPSL        CAR                         00194000
2030  3171        8F 71 98                    ADDA,R0     BASE+D'-1',R3               00194100
2031  3174        CC 1F FC                    STRA,R0     DATAS                       00194200
2032  3177        01                          LODZ        R1                          00194300
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

2033  3178        8F 71 07                    ADDA,R0     BASE+0'-2',R3                  00194400
2034  317B        C1                          STRZ        R1                             00194500
2035  317C        75 01                       CPSL        CAR                            00194600
2036  317E        53                          RRR,R3                                     00194700
2037  317F        02                          LODZ        R2                             00194800
2038  3180        CF 7F F5                    STRA,R0     BCDBUF,R3                      00194900
2039  3183        0C 1F FC                    LODA,R0     DATAS                          00195000
2040  3186        03                          RRL,R3                                     00195100
2041  3187        77 01                       PPSL        CAR                            00195200
2042  3189        A7 02                       SUBI,R3     2                              00195300
2043  318B        98 4A                       BCFR,Z      LOOP33                         00195400
2044  318D        CC 1F F5                    STRA,R0     BCOBUF                         00195500
2045  3190        0E 1F FA                    LODA,R2     REG2                           00195600
2046  3193        0F 1F FB                    LODA,R3     REG3                           00195700
2047  3196        75 08                       CPSL        WC                             00195800
2048  3198        17                          RETC,UN                                    00195900
2049                                  ********************************************************** 00196000
2050  3199  3199  00 0A 00 64       BASE      DATA        H'00,0A,00,64,03,E8,27,10'     00196100
2051              03 E8 27 10
2052                                  ********************************************************** 00196200
2053  31A1  31A1  0F 5F F5            PRBCD     LODA,R0     BCOBUF,R3,-                    00196300
2054  31A4        98 02                       BCFR,Z      GEENLZ                         00196400
2055  31A6        5B 08                       BRNR,R3     LSZUP                          00196500
2056  31A8  31A8  84 30               GEENLZ    ADDI,R0     H'30'                          00196600
2057  31AA        3F 2E 79                    BSTA,UN     WRCHAR                         00196700
2058  31AD        5B 08                       BRNR,R3     GETDAT                         00196800
2059  31AF        17                          RETC,UN                                    00196900
2060                                  ********************************************************** 00197000
2061  31B0  31B0  04 20               LSZUP     LODI,R0     A[SP]                          00197100
2062  31B2        3F 2E 79                    BSTA,UN     WRCHAR                         00197200
2063  31B5        1B 6A                       BCTR,UN     PRBCD                          00197300
2064                                  ********************************************************** 00197400
2065  31B7  31B7  0F 5F F5            GETDAT    LODA,R0     BCOBUF,R3,-                    00197500
2066  31BA        1B 6C                       BCTR,UN     GEENLZ                         00197600
2067                                  ********************************************************** 00197700
2068  31BC  31BC  05 04               GETLAB    LODI,R1     4                              00197800
2069  31BE  31BE  04 20               LOOP35    LODI,R0     A[SP]                          00197900
2070  31C0        CD 5F 2A                    STRA,R0     BUF8,R1,-                      00198000
2071  31C3        59 79                       BRNR,R1     LOOP35                         00198100
2072  31C5        0F 1F 75                    LODA,R3     CHARNR                         00198200
2073  31C8  31C8  0F 3F 7A            LOOP36    LODA,R0     BUF5+0'-1',R3,+                00198300
2074  31CB        18 18                       BCTR,Z      NOTENO                         00198400
2075  31CD        9A 1A                       BCFR,N      TESTS                          00198500
2076  31CF        44 7F                       ANDI,R0     H'7F'                          00198600
2077  31D1        CD 3F 29                    STRA,R0     BUF8+0'-1',R1,+                00198700
2078  31D4        E5 04                       COMI,R1     4                              00198800
2079  31D6        98 70                       BCFR,Z      LOOP36                         00198900
2080  31D8        0F 7F 7B                    LODA,R0     BUF5,R3                        00199000
2081  31DB        18 08                       BCTR,Z      NOTEND                         00199100
2082  31DD        E4 20                       COMI,R0     A[SP]                          00199200
2083  31DF        98 0E                       BCFR,Z      TSTAC                          00199300
2084  31E1  31E1  05 00               CRTLO     LODI,R1     0                              00199400
```

```
ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE
31E3        1B 1C                             BCTR,UN     RETRN           00199500
                               ******************************************************* 00199600
31E5  31E5  05 FF              NOTFND         LODI,R1     255             00199700
31E7        1B 18                             BCTR,UN     RETRN           00199800
                               ******************************************************* 00199900
31E9  31E9  A7 01              TESTS          SUBI,R3     1               00200000
31EB        E4 20                             COMI,R0     A[SP]           00200100
31ED        18 72                             BCTR,Z      CRTLO           00200200
31EF  31EF  E4 2C              TSTAC          COMI,R0     A',' 00200300
31F1        18 0C                             BCTR,Z      CRTL1B          00200400
31F3        E4 2B                             COMI,R0     A'+'            00200500
31F5        18 08                             BCTR,Z      CRTL1B          00200600
31F7        E4 2D                             COMI,R0     H'2D' = A'-'    00200700
31F9        18 04                             BCTR,Z      CRTL1B          00200800
31FB        05 02                             LODI,R1     2               00200900
31FD        1B 02                             BCTR,UN     RETRN           00201000
                               ******************************************************* 00201100
31FF  31FF  05 01              CRTL1B         LODI,R1     1               00201200
3201  3201  CD 1F 79           RETRN          STRA,R1     CRTL            00201300
3204        CF 1F 75                          STRA,R3     CHARNR          00201400
3207        17                                RETC,UN                     00201500
                               ******************************************************* 00201600
3208  3208  0C 1F 7C           PRLIN          LODA,R0     PASS            00201700
320B        44 BF                             ANDI,R0     H'BF'           00201800
320D        E4 02                             COMI,R0     2               00201900
320F        16                                RETC,N                      00202000
3210        15                                RETC,P                      00202100
3211        3F 2E 00                          BSTA,UN     CRLF            00202200
3214        0D 1F 77                          LODA,R1     LINENR          00202300
3217        0C 1F 78                          LODA,R0     LINENR+1        00202400
321A        3F 31 4B                          BSTA,UN     BINBCD          00202500
321D        07 04                             LODI,R3     4               00202600
321F        3F 31 A1                          BSTA,UN     PRBCD           00202700
3222        0C 1F 7B                          LODA,R0     BUF5            00202800
3225        E4 2A                             COMI,R0     A'*'            00202900
3227        98 08                             BCFR,Z      WRADR           00203000
3229        07 18                             LODI,R3     24              00203100
322B        3F 2E 5E                          BSTA,UN     WRTBL           00203200
322E        1F 32 9D                          BCTA,UN     PRSOUR          00203300
                               ******************************************************* 00203400
3231  3231  3F 2E 5C           WRADR          BSTA,UN     WRT1BL          00203500
3234        0D 1F 79                          LODA,R1     ADDRES          00203600
3237        3F 2E 65                          BSTA,UN     WHEX            00203700
323A        0D 1F 7A                          LODA,R1     ADDRES+1        00203800
323D        3F 2E 65                          BSTA,UN     WHEX            00203900
3240        3F 2E 5C                          BSTA,UN     WRT1BL          00204000
3243        07 0E                             LODI,R3     14              00204100
3245        0E 1F 72                          LODA,R2     ADRTYP          00204200
3248        E6 01                             COMI,R2     1               00204300
324A        98 0B                             BCFR,Z      GEENER          00204400
324C        0E 1F 73                          LODA,R2     OPC1            00204500
324F        E6 03                             COMI,R2     3               00204600
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

2137  3251        18 04                    BCTR,Z      GEENER                    00204700
2138  3253        E6 06                    COMI,R2     6                         00204800
2139  3255        98 32                    BCFR,Z      PRERR                     00204900
2140  3257  3257  0E 1F C6          GEENER LODA,R2     BYTC00                    00205000
2141  325A        E6 05                    COMI,R2     5                         00205100
2142  325C        1A 02                    BCTR,N      KL5                       00205200
2143  325E        06 04                    LODI,R2     4                         00205300
2144  3260  3260  CE 1F 77          KL5     STRA,R2     REG3A                     00205400
2145  3263        CE 1F 76                 STRA,R2     REG0A                     00205500
2146  3265        06 FF                    LODI,R2     255                       00205600
2147  3268  3268  0E 3F C7          LOOP38  LODA,R0     BYTE1,R2,+                00205700
2148  326B        C1                       STRZ        R1                        00205800
2149  326C        3F 2E 65                 BSTA,UN     WHEX                      00205900
2150  326F        3F 2E 5C                 BSTA,UN     WRT1BL                    00206000
2151  3272        0F 1F 77                 LODA,R3     REG3A                     00206100
2152  3275        A7 01                    SUBI,R3     1                         00206200
2153  3277        CF 1F 77                 STRA,R3     REG3A                     00206300
2154  327A        5B 6C                    BRNR,R3     LOOP38                    00206400
2155  327C        0C 1F 76                 LODA,R0     REG0A                     00206500
2156  327F        07 0B                    LODI,R3     11                        00206600
2157  3281  3281  F8 02            LOOP39  BDRR,R0     NOG                       00206700
2158  3283        1B 04                    BCTR,UN     PRERR                     00206800
2159              ********************************************************************** 00206900
2160  3285  3285  A7 03            NOG     SUBI,R3     3                         00207000
2161  3287        1B 78                    BCTR,UN     LOOP39                    00207100
2162              ********************************************************************** 00207200
2163  3289  3289  A7 01            PRERR   SUBI,R3     1                         00207300
2164  328B        3F 2E 5E                 BSTA,UN     WRTBL                     00207400
2165  328E        06 00                    LODI,R2     0                         00207500
2166  3290  3290  0E 3F 94          LOOP40  LODA,R0     BUF3+D'-1',R2,+           00207600
2167  3293        3F 2E 79                 BSTA,UN     WRCHAR                    00207700
2168  3295        E6 04                    COMI,R2     4                         00207800
2169  3298        98 76                    BCFR,Z      LOOP40                    00207900
2170  329A        3F 2E 5C                 BSTA,UN     WRT1BL                    00208000
2171  329D  329D  07 00            PRSOUR  LODI,R3     0                         00208100
2172  329F  329F  0F 3F 7A          LOOP41  LODA,R0     BUF5+D'-1',R3,+           00208200
2173  32A2        18 07                    BCTR,Z      KLRPRN                    00208300
2174  32A4        3F 2E 79                 BSTA,UN     WRCHAR                    00208400
2175  32A7        E7 2C                    COMI,R3     44                        00208500
2176  32A9        98 74                    BCFR,Z      LOOP41                    00208600
2177  32AB  32AB  0C 1F 74          KLRPRN  LODA,R0     LINPAG                    00208700
2178  32AE        A4 01                    SUBI,R0     1                         00208800
2179  32B0        CC 1F 74                 STRA,R0      LINPAG                   00208900
2180  32B3        3C 30 AA                 BSTA,Z      NEWPAG                    00209000
2181  32B5        0D 1F C6                 LODA,R1     BYTC0D                    00209100
2182  32B9        E5 05                    COMI,R1     5                         00209200
2183  32BB        16                       RETC,N                                00209300
2184  32BC        04 03                    LODI,R0     3                         00209400
2185  32BE        CC 1F 78                 STRA,R0     REG2A                     00209500
2186  32C1        06 00                    LODI,R2     0                         00209600
2187  32C3        51                       RRR,R1                                00209700
2188  32C4        9A 02                    BCFR,N      ROTA                      00209800
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

2189  32C5        86 01                         ADDI,R2     1                                  00209900
2190  32C8  32C8  51                   ROTA       RRR,R1                                         00210000
2191  32C9        9A 02                         BCFR,N      AND                                00210100
2192  32CB        86 02                         ADDI,R2     2                                  00210200
2193  32CD  32CD  45 3F                AND        ANDI,R1     H'3F'                              00210300
2194  32CF        CE 1F 7A                      STRA,R2     REGOBJ                             00210400
2195  32D2  32D2  F9 02                LSTBYT     BDRR,R1     STR1                               00210500
2196  32D4        1B 3B                         BCTR,UN     WRDBJ                              00210600
2197                                   ********************************************************** 00210700
2198  32D6  32D6  CD 1F 79             STR1        STRA,R1     REG1A                             00210800
2199  32D9        3F 2E 00                      BSTA,UN     CRLF                               00210900
2200  32DC        07 0A                         LODI,R3     10                                 00211000
2201  32DE        3F 2E 5E                      BSTA,UN     WRTBL                              00211100
2202  32E1        07 04                         LODI,R3     4                                  00211200
2203  32E3        CF 1F 77                      STRA,R3     REG3A                              00211300
2204  32E6        0E 1F 78                      LODA,R2     REG2A                              00211400
2205  32E9  32E9  0E 3F 07             LODP43     LODA,R0     BYTE1,R2,+                         00211500
2206  32EC        C1                            STRZ        R1                                 00211600
2207  32ED        3F 2E 65                      BSTA,UN     WHEX                               00211700
2208  32FD        3F 2E 5C                      BSTA,UN     WRT1BL                             00211800
2209  32F3        0F 1F 77                      LODA,R3     REG3A                              00211900
2210  32F6        A7 01                         SUBI,R3     1                                  00212000
2211  32F8        CF 1F 77                      STRA,R3     REG3A                              00212100
2212  32FB        5B 6C                         BRNR,R3     LODP43                             00212200
2213  32FD        CE 1F 78                      STRA,R2     REG2A                              00212300
2214  3300        0C 1F 74                      LODA,R0     LINPAG                             00212400
2215  3303        A4 01                         SUBI,R0     1                                  00212500
2216  3305        C0 1F 74                      STRA,R1     LINPAG                             00212600
2217  3308        3C 30 AA                      BSTA,Z      NEWPAG                             00212700
2218  330B        00 1F 79                      LODA,R1     REG1A                              00212800
2219  330E        1F 32 02                      BCTA,UN     LSTBYT                             00212900
2220                                   ********************************************************** 00213000
2221  3311  3311  0F 1F 7A             WRDBJ      LODA,R3     REGDBJ                             00213100
2222  3314        5B 01                         BRNR,R3     NOTEMP                             00213200
2223  3316        17                            RETC,UN                                        00213300
2224  3317  3317  3F 2E 00             NOTEMP     BSTA,UN     CRLF                               00213400
2225  331A        CF 1F 77                      STRA,R3     REG3A                              00213500
2226  331D        07 0A                         LODI,R3     10                                 00213600
2227  331F        3F 2E 5E                      BSTA,UN     WRTBL                              00213700
2228  3322        0E 1F 78                      LODA,R2     REG2A                              00213800
2229  3325  3325  0E 3F 07             LODP44     LODA,R0     BYTE1,R2,+                         00213900
2230  3328        C1                            STRZ        R1                                 00214000
2231  3329        3F 2E 65                      BSTA,UN     WHEX                               00214100
2232  332C        3F 2E 5C                      BSTA,UN     WRT1BL                             00214200
2233  332F        0F 1F 77                      LODA,R3     REG3A                              00214300
2234  3332        A7 01                         SUBI,R3     1                                  00214400
2235  3334        CF 1F 77                      STRA,R3     REG3A                              00214500
2236  3337        5B 6C                         BRNR,R3     LODP44                             00214600
2237  3339        0C 1F 74                      LODA,R0     LINPAG                             00214700
2238  333C        A4 01                         SUBI,R0     1                                  00214800
2239  333E        CC 1F 74                      STRA,R0     LINPAG                             00214900
2240  3341        1C 30 AA                      BCTA,Z      NEWPAG                             00215000
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

2241  3344        17                        RETC,UN                                                    00215100
2242              ********************************************************************************** 00215200
2243  3345  3345  3F 2F C3          CONTST    BSTA,UN       ENDREG                                       00215300
2244  3348        15                        RETC,P                                                     00215400
2245  3349        CF 1F DC                  STRA,R3       SRCPNT                                       00215500
2246  334C        05 01                     LODI,R1       1                                            00215600
2247  334E        C3 1F D9                  STRA,R1       NEGCON                                       00215700
2248  3351        20                        EORZ          R0                                           00215800
2249  3352        CC 1F DE                  STRA,R0       INDIR                                        00215900
2250  3355        CC 1F D7                  STRA,R0       ABUF                                         00216000
2251  3358        CC 1F D8                  STRA,R0       ABUF+1                                       00216100
2252  335B        06 FF                     LODI,R2       255                                          00216200
2253  335D        0F 3F 7A                  LODA,R0       BUF5+0'-1',R3,+                              00216300
2254  3360        E4 3E                     COMI,R0       A'>'                                         00216400
2255  3362        18 08                     BCTR,Z        STPOIN                                       00216500
2256  3364        06 00                     LODI,R2       0                                            00216600
2257  3366        E4 3C                     COMI,R0       A'<'                                         00216700
2258  3368        98 08                     BCFR,Z        STHAAK                                       00216800
2259  336A        06 01                     LODI,R2       1                                            00216900
2260  336C  336C  CF 1F DC          STPOIN    STRA,R3       SRCPNT                                       00217000
2261  336F        0F 3F 7A                  LODA,R0       BUF5+0'-1',R3,+                              00217100
2262  3372  3372  CE 1F DF          STHAAK    STRA,R2       HAAK                                         00217200
2263  3375        E4 2A                     COMI,R0       A'*'                                         00217300
2264  3377        98 11                     BCFR,Z        STNR                                         00217400
2265  3379        04 01                     LODI,R0       1                                            00217500
2266  337B        CC 1F DE                  STRA,R0       INDIR                                        00217600
2267  337E  337E  CF 1F DC          PLUS      STRA,R3       SRCPNT                                       00217700
2268  3381        EF 1F C3                  COMA,R3       CHACNT                                       00217800
2269  3384        9E 34 75                  BCFA,N        CRTL11                                       00217900
2270  3387        0F 3F 7A                  LODA,R0       BUF5+0'-1',R3,+                              00218000
2271  338A  338A  CF 1F 75          STNR      STRA,R3       CHARNR                                       00218100
2272  338D        05 01                     LODI,R1       1                                            00218200
2273  338F        C3 1F D9                  STRA,R1       NEGCON                                       00218300
2274  3392  3392  E4 24            COMTEK    COMI,R0       A'$'                                         00218400
2275  3394        1C 34 9E                  BCTA,Z        DOLLAR                                       00218500
2276  3397        E4 2B                     COMI,R0       A'+'                                         00218600
2277  3399        18 63                     BCTR,Z        PLUS                                         00218700
2278  339B        E4 2D                     COMI,R0       H'2D' !!!!!!!!!!!!!                          00218800
2279  339D        1C 34 7A                  BCTA,Z        MINUS                                        00218900
2280  33A0        E4 2C                     COMI,R0       A','                                         00219000
2281  33A2        1C 34 53                  BCTA,Z        COMMA                                        00219100
2282  33A5        0F 7F 7B                  LODA,R0       BUF5,R3                                      00219200
2283  33A8        E4 27                     COMI,R0       A''''                                        00219300
2284  33AA        1C 34 C6                  BCTA,Z        ACCENT                                       00219400
2285  33AD        0F 7F 7A                  LODA,R0       BUF5+0'-1',R3                                00219500
2286  33B0        9E 34 75                  BCFA,N        CRTL11                                       00219600
2287  33B3        E4 C1                     COMI,R0       H'C1'                                        00219700
2288  33B5        1E 34 4B                  BCTA,N        STOOL                                        00219800
2289  33B8        FB 00                     BDRR,R3       NRMIN1                                       00219900
2290  33BA  33BA  CF 1F 75          NRMIN1    STRA,R3       CHARNR                                       00220000
2291  33BD        3F 31 BC                  BSTA,UN       GETLAB                                       00220100
2292  33C0        E5 02                     COMI,R1       2                                            00220200
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

2293  33C2        1C 34 75                    BCTA,Z      CRTL11                                00220300
2294  33C5        3F 2E 9A                    BSTA,UN     LABEL                                 00220400
2295  33C8        0C 1F 29                    LODA,R0     CRTL                                  00220500
2296  33CB        9C 34 75                    BCFA,Z      CRTL11                                00220600
2297  33CE        3F 2E F2                    BSTA,UN     FILAB                                 00220700
2298  33D1        0D 1F 43                    LODA,R1     POINT4                                00220800
2299  33D4        1E 34 79                    BCTA,N      CRTLFF                                00220900
2300  33D7        3F 30 61                    BSTA,UN     PT4PL2                                00221000
2301  33DA        07 01                       LODI,R3     1                                     00221100
2302  33DC        0F FF 43                    LODA,R0     *POINT4,R3                            00221200
2303  33DF        C1                          STRZ        R1                                    00221300
2304  33E0        0F BF 43                    LODA,R0     *POINT4,R3,+                          00221400
2305  33E3        C2                          STRZ        R2                                    00221500
2306  33E4        3F 34 7D                    BSTA,UN     RELADR                                00221600
2307  33E7  33E7  0F 1F 75            TSTCOM  LODA,R3     CHARNR                                00221700
2308  33EA        0F 7F 7B                    LODA,R0     BUF5,R3                               00221800
2309  33ED        1C 34 53                    BCTA,Z      COMMA                                 00221900
2310  33F0        E4 20                       COMI,R0     A(SP)                                 00222000
2311  33F2        1C 34 53                    BCTA,Z      COMMA                                 00222100
2312  33F5        E4 2C                       COMI,R0     A','                                  00222200
2313  33F7        1C 34 53                    BCTA,Z      COMMA                                 00222300
2314  33FA        E4 2B                       COMI,R0     A'+'                                  00222400
2315  33FC        1C 33 7E                    BCTA,Z      PLUS                                  00222500
2316  33FF        E4 2D                       COMI,R0     H'2D'    !!!!!!!!!!!!!!!!!!!          00222600
2317  3401        18 37                       BCTR,Z      MINUS                                 00222700
2318  3403        1F 34 75                    BCTA,UN     CRTL11                                00222800
2319                                  ********************************************************* 00222900
2320  3406  3406  3F 34 B4            ACCENT  BSTA,UN     STRING                                00223000
2321  3409        9C 34 75                    BCFA,Z      CRTL11                                00223100
2322  340C        0C 1F DB                    LODA,R0     STRLEN                                00223200
2323  340F        E4 01                       COMI,R0     1                                     00223300
2324  3411        1E 34 75                    BCTA,N      CRTL11                                00223400
2325  3414        18 11                       BCTR,Z      BUF90                                 00223500
2326  3416        E4 02                       COMI,R0     2                                     00223600
2327  3418        1D 34 75                    BCTA,P      CRTL11                                00223700
2328  341B        0D 1F F3                    LODA,R1     BUF9                                  00223800
2329  341E        0E 1F F4                    LODA,R2     BUF9+1                                00223900
2330  3421  3421  3F 34 7D            RELA    BSTA,UN     RELADR                                00224000
2331  3424        1F 33 F7                    BCTA,UN     TSTCOM                                00224100
2332                                  ********************************************************* 00224200
2333  3427  3427  05 00              BUF90   LODI,R1     0                                     00224300
2334  3429        0E 1F F3                    LODA,R2     BUF9                                  00224400
2335  342C        18 73                       BCTR,UN     RELA                                  00224500
2336                                  ********************************************************* 00224600
2337  342E  342E  0D 1F 31            DOLLAR  LODA,R1     COUNT2                                00224700
2338  3431        0E 1F 32                    LODA,R2     COUNT2+1                              00224800
2339  3434        3F 34 7D                    BSTA,UN     RELADR                                00224900
2340  3437        1F 33 F7                    BCTA,UN     TSTCOM                                00225000
2341                                  ********************************************************* 00225100
2342  343A  343A  05 FF              MINUS   LODI,R1     255                                   00225200
2343  343C        CD 1F D9                    STRA,R1     NEGCON                                00225300
2344  343F        CF 1F DC                    STRA,R3     SRCPNT                                00225400
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

2345  3442        0F 3F 7A                LODA,R0     BUF5+D'-1',R3,+                00225500
2346  3445        CF 1F 75                STRA,R3     CHARNR                         00225600
2347  3448        1F 33 92                BCTA,UN     COMTEK                         00225700
2348              ************************************************************** 00225800
2349  344B  344B  04 24           STDOL  LODI,R0     A'$'                           00225900
2350  344D        CC 1F 7A                STRA,R0     BUF8                           00226000
2351  3450        1F 34 D6                BCTA,UN     ACCENT                         00226100
2352              ************************************************************** 00226200
2353  3453  3453  EF 1F DC           COMMA  COMA,R3     SRCPNT                         00226300
2354  3456        1C 34 73                BCTA,Z      CRTPL3                         00226400
2355  3459        0C 1F DF                LODA,R0     HAAK                           00226500
2356  345C        18 06                   BCTR,Z      STOCRT                         00226600
2357  345E        19 08                   BCTR,P      BUFP1                          00226700
2358  3460  3460  20             RETCM  EORZ        R0                             00226800
2359  3461        CC 1F D7                STRA,R0     ABUF                           00226900
2360  3464  3464  CC 1F 29       STOCRT  STRA,R0     CRTL                           00227000
2361  3467        CF 1F 75                STRA,R3     CHARNR                         00227100
2362  346A        17                      RETC,UN                                    00227200
2363              ************************************************************** 00227300
2364  346B  346B  0C 1F D7       BUFP1  LODA,R0     ABUF                           00227400
2365  346E        CC 1F D8                STRA,R0     ABUF+1                         00227500
2366  3471        18 60                   BCTR,UN     RETCM                          00227600
2367              ************************************************************** 00227700
2368  3473  3473  0B 00         CRTPL3  BIRR,R3     CRTL11                         00227800
2369  3475  3475  04 01         CRTL11  LODI,R0     1                              00227900
2370  3477        18 68                   BCTR,UN     STOCRT                         00228000
2371              ************************************************************** 00228100
2372  3479  3479  04 FF         CRTLFF  LODI,R0     255                            00228200
2373  347B        1B 67                   BCTR,UN     STOCRT                         00228300
2374              ************************************************************** 00228400
2375  347D  347D  0C 1F D9       RELADR  LODA,R0     NEGCON                         00228500
2376  3480        1A 11                   BCTR,N      COMREL                         00228600
2377  3482  3482  8E 1F D8       ADABF  ADDA,R2     ABUF+1                         00228700
2378  3485        77 08                   PPSL        WC                             00228800
2379  3487        8D 1F D7                ADDA,R1     ABUF                           00228900
2380  348A        75 08                   CPSL        WC                             00229000
2381  348C        CD 1F D7                STRA,R1     ABUF                           00229100
2382  348F        CE 1F D8                STRA,R2     ABUF+1                         00229200
2383  3492        17                      RETC,UN                                    00229300
2384              ************************************************************** 00229400
2385  3493  3493  3B 13         COMREL  BSTR,UN     COMPL2                         00229500
2386  3495        1B 6B                   BCTR,UN     ADABF                          00229600
2387              ************************************************************** 00229700
2388  3497  3497  75 01         ROTA16  CPSL        CAR                            00229800
2389  3499        77 08                   PPSL        WC                             00229900
2390  3498        D2                      RRL,R2                                     00230000
2391  349C        D1                      RRL,R1                                     00230100
2392  349D  349D  75 08         CLPSW  CPSL        WC                             00230200
2393  349F        17                      RETC,UN                                    00230300
2394              ************************************************************** 00230400
2395  34A0  34A0  82             ADNR   ADDZ        R2                             00230500
2396  34A1        C2                      STRZ        R2                             00230600
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

2397  34A2        77 08                      PPSL            WC                      00230700
2398  34A4        85 00                      ADDI,R1         0                       00230800
2399  34A5        1B 75                      BCTR,UN         CLPSW                   00230900
2400                                 ********************************************************** 00231000
2401  34A8  34A8  25 FF             COMPL2   EORI,R1         255                     00231100
2402  34AA        26 FF                      EORI,R2         255                     00231200
2403  34AC        86 01                      ADDI,R2         1                       00231300
2404  34AE        77 08                      PPSL            WC                      00231400
2405  34B0        84 01                      ADDI,R0         1                       00231500
2406  34B2        1B 69                      BCTR,UN         CLPSW                   00231600
2407                                 ********************************************************** 00231700
2408  34B4  34B4  20                 STRING   EORZ            R0                      00231800
2409  34B5        CC 1F DB                   STRA,R0         STRLEN                  00231900
2410  34B8        CC 1F DD                   STRA,R0         CONTRL                  00232000
2411  34BB        07 11                      LODI,R3         17                      00232100
2412  34BD  34B0  CF 5F F3           LOOP59   STRA,R0         BUF9,R3,-               00232200
2413  34C0        5B 7B                      BRNR,R3         LOOP59                  00232300
2414  34C2        05 01                      LODI,R1         1                       00232400
2415  34C4        CD 1F DA                   STRA,R1         TEKEN                   00232500
2416  34C7        0C 1F 75                   LODA,R0         CHARNR                  00232600
2417  34CA        0F 7F 7A                   LODA,R0         BUF5+D'-1',R3           00232700
2418  34CD        C2                         STRZ            R2                      00232800
2419  34CE        0F 3F 7A                   LODA,R0         BUF5+D'-1',R3,+         00232900
2420  34D1        E4 27                      COMI,R0         A''''                   00233000
2421  34D3        98 1B                      BCFR,Z          GEENAC                  00233100
2422  34D5        E6 C2                      COMI,R2         H'C2'                   00233200
2423  34D7        18 24                      BCTR,Z          BINSTR                  00233300
2424  34D9        E6 CF                      COMI,R2         H'CF'                   00233400
2425  34DB        1C 35 DC                   BCTA,Z          OCTSTR                  00233500
2426  34DE        E6 C4                      COMI,R2         H'C4'                   00233600
2427  34E0        1C 36 25                   BCTA,Z          DECSTR                  00233700
2428  34E3        E6 C8                      COMI,R2         H'C8'                   00233800
2429  34E5        1C 35 B0                   BCTA,Z          HEXSTR                  00233900
2430  34E8        E6 C1                      COMI,R2         H'C1'                   00234000
2431  34EA        1C 36 B6                   BCTA,Z          ASCSTR                  00234100
2432  34ED        1F 36 FF                   BCTA,UN         CRTL1S                  00234200
2433                                 ********************************************************** 00234300
2434  34F0  34F0  0E 1F 7A           GEENAC   LODA,R2         BUF8                    00234400
2435  34F3        E6 24                      COMI,R2         A'$'                    00234500
2436  34F5        9C 36 F3                   BCFA,Z          CRTFFS                  00234600
2437  34F8        A7 02                      SUBI,R3         2                       00234700
2438  34FA        1F 36 25                   BCTA,UN         DECSTR                  00234800
2439                                 ********************************************************** 00234900
2440  34FD  34FD  05 00              BINSTR   LODI,R1         0                       00235000
2441  34FF        CD 1F FD                   STRA,R1         STRCON                  00235100
2442  3502        06 00                      LODI,R2         0                       00235200
2443  3504        EE 1F C3                   COMA,R2         CHACNT                  00235300
2444  3507        9A A5                      BCFR,N         *FTADR1                  00235400
2445  3509        0F 3F 7A                   LODA,R0          BUF5+D'-1',R3,+         00235500
2446  350C        9A 15                      BCFR,N          BIT80B                  00235600
2447  350E  350E  A4 B0              LOOP45   SUBI,R0         H'B0'                   00235700
2448  3510        E4 01                      COMI,R0         1                       00235800
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

2449  3512        19 9A                        BCTR,P      *FTAOR1                                  00235900
2450  3514        3F 34 97                     BSTA,UN     ROTA16                                   00236000
2451  3517        3F 34 A0                     BSTA,UN     AONR                                     00236100
2452  351A        1A 92                        BCTR,N      *FTAOR1                                  00236200
2453  351C  351C  0F 3F 7A          LOOP46     LODA,R0     BUF5+0'-1',R3,+                          00236300
2454  351F        9A 13                        BCFR,N      TSTACC                                   00236400
2455  3521        1B 6B                        BCTR,UN     LOOP45                                   00236500
2456                              ************************************************************** 00236600
2457  3523  3523  E4 20            BIT80B     COMI,R0     H'20'  !!!!!!!!!!!!!!!!                  00236700
2458  3525        98 09                        BCFR,Z      TSTPLB                                   00236800
2459  3527        04 FF                        LODI,R0     255                                      00236900
2460  3529        CC 1F DA                     STRA,R0     TEKEN                                    00237000
2461  352C        1B 6E                        BCTR,UN     LOOP46                                   00237100
2462                              ************************************************************** 00237200
2463  352E  352E  36 EF            FTAOR1     ACON        CRTL1S                                   00237300
2464                              ************************************************************** 00237400
2465  3530  3530  E4 2B            TSTPLB     COMI,R0     A'+'                                     00237500
2466  3532        18 68                        BCTR,Z      LOOP46                                   00237600
2467  3534  3534  E4 27            TSTACC     COMI,R0     A''''                                    00237700
2468  3536        9C 35 85                     BCFA,Z      COMCOM                                   00237800
2469  3539  3539  04 02            LOOP47     LODI,R0     2                                        00237900
2470  353B        CC 1F DD                     STRA,R0     CONTRL                                   00238000
2471  353E  353E  CF 1F 75          LOOP48     STRA,R3     CHARNR                                   00238100
2472  3541        0F 1F DB                     LODA,R3     STRLEN                                   00238200
2473  3544        0C 1F DA                     LODA,R0     TEKEN                                    00238300
2474  3547        3E 34 A8                     BSTA,N      COMPL2                                   00238400
2475  354A        01                           LODZ        R1                                       00238500
2476  354B        18 07                        BCTR,Z      BORROW                                   00238600
2477  354D        E4 FF                        COMI,R0     255                                      00238700
2478  354F        18 03                        BCTR,Z      BORROW                                   00238800
2479  3551        CF 3F F2                     STRA,R0     BUF9+0'-1',R3,+                          00238900
2480  3554  3554  02            BORROW     LODZ        R2                                       00239000
2481  3555        CF 3F F2                     STRA,R0     BUF9+0'-1',R3,+                          00239100
2482  3558        CF 1F DB                     STRA,R3     STRLEN                                   00239200
2483  355B        04 01                        LODI,R0     1                                        00239300
2484  355D        CC 1F DA                     STRA,R0     TEKEN                                    00239400
2485  3560        E7 10                        COMI,R3     16                                       00239500
2486  3562        19 1C                        BCTR,P      CRTL2S                                   00239600
2487  3564        0C 1F DD                     LODA,R0     CONTRL                                   00239700
2488  3567        10 36 F5                     BCTA,P      KLAARS                                   00239800
2489  356A        0F 1F 75                     LODA,R3     CHARNR                                   00239900
2490  356D        0C 1F F0                     LODA,R0     STRCON                                   00240000
2491  3570        1C 34 F0                     BCTA,Z      BINSTR                                   00240100
2492  3573        E4 01                        COMI,R0     1                                        00240200
2493  3575        1C 35 A0                     BCTA,EQ     HEXSTR                                   00240300
2494  3578        E4 02                        COMI,R0     2                                        00240400
2495  357A        1C 35 DC                     BCTA,EQ     OCTSTR                                   00240500
2496  357D        1F 36 25                     BCTA,UN     DECSTR                                   00240600
2497                              ************************************************************** 00240700
2498  3580  3580  04 02            CRTL2S     LODI,R0     2                                        00240800
2499  3582        1F 36 FB                     BCTA,UN     STCRTL                                   00240900
2500                              ************************************************************** 00241000
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

2501  3585  3585  E4 2C          COMCOM      COMI,R0     A',' 00241100
2502  3587        1C 35 7E                   BCTA,Z      LOOP48 00241200
2503  358A  358A  1F 36 FF       BRC1S       BCTA,UN     CRTL1S 00241300
2504                             ********** 00241400
2505  358D  358D  05 01          HEXSTR      LODI,R1     1 00241500
2506  358F        CC 1F F0                   STRA,R0     STRCON 00241600
2507  3592        05 00                      LODI,R1     0 00241700
2508  3594        06 00                      LODI,R2     0 00241800
2509  3596        EF 1F C3                   COMA,R3     CHACNT 00241900
2510  3599        9A 6F                      BCFR,N      BRC1S 00242000
2511  359B        0F 3F 7A                   LODA,R0     BUF5+D'-1',R3,+ 00242100
2512  359E        9A 2A                      BCFR,N      BIT80H 00242200
2513  35A0  35A0  44 7F          TSTHEX      ANDI,R0     H'7F' 00242300
2514  35A2        E4 46                      COMI,R0     A'F' 00242400
2515  35A4        19 64                      BCTR,P      BRC1S 00242500
2516  35A6        A4 30                      SUBI,R0     H'30' 00242600
2517  35A8        E4 09                      COMI,R0     9 00242700
2518  35AA        99 02                      BCFR,P      KLN10 00242800
2519  35AC        A4 07                      SUBI,R0     7 00242900
2520  35AE  35AE  CF 1F 76       KLN10       STRA,R3     REG0A 00243000
2521  35B1        07 04                      LODI,R3     4 00243100
2522  35B3  35B3  3F 34 97       LOOP58      BSTA,UN     ROTA16 00243200
2523  35B6        1A 52                      BCTR,N      BRC1S 00243300
2524  35B8        FB 79                      BDRR,R3     LOOP58 00243400
2525  35BA        3F 34 A0                   BSTA,UN     ADNR 00243500
2526  35BD        1A 48                      BCTR,N      BRC1S 00243600
2527  35BF        0F 1F 76                   LODA,R3     REG0A 00243700
2528  35C2  35C2  0F 3F 7A       LOOP49      LODA,R0     BUF5+D'-1',R3,+ 00243800
2529  35C5        9E 35 74                   BCFA,N      TSTACC 00243900
2530  35C8        1B 56                      BCTR,UN     TSTHEX 00244000
2531                             ********** 00244100
2532  35CA  35CA  E4 20          BIT80H      COMI,R0     H'20'  !!!!!!!!!!!!! 00244200
2533  35CC        98 07                      BCFR,Z      TSTPLS 00244300
2534  35CE        04 FF                      LODI,R0     255 00244400
2535  35D0        CC 1F DA                   STRA,R0     TEKEN 00244500
2536  35D3        1B 6D                      BCTR,UN     LOOP49 00244600
2537                             ********** 00244700
2538  35D5  35D5  E4 2B          TSTPLS      COMI,R0     A'+' 00244800
2539  35D7        18 69                      BCTR,Z      LOOP49 00244900
2540  35D9        1F 35 74                   BCTA,UN     TSTACC 00245000
2541                             ********** 00245100
2542  35DC  35DC  05 02          OCTSTR      LODI,R1     2 00245200
2543  35DE        CD 1F F0                   STRA,R1     STRCON 00245300
2544  35E1        05 00                      LODI,R1     0 00245400
2545  35E3        06 00                      LODI,R2     0 00245500
2546  35E5        EF 1F C3                   COMA,R3     CHACNT 00245600
2547  35E8        9A B9                      BCFR,N      *FOUTAD 00245700
2548  35EA        0F 3F 7A                   LODA,R0     BUF5+D'-1',R3,+ 00245800
2549  35ED        9A 22                      BCFR,N      BIT800 00245900
2550  35EF  35EF  A4 B0          TSTOCT      SUBI,R0     H'B0' 00246000
2551  35F1        E4 07                      COMI,R0     7 00246100
2552  35F3        19 AE                      BCTR,P      *FOUTAD 00246200
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

2553  35F5        CF 1F 76                    STRA,R3     REGOA                                  00246300
2554  35F8        07 03                       LODI,R3     3                                      00246400
2555  35FA  35FA  3F 34 97          LOOP50    BSTA,UN     ROTA16                                 00246500
2556  35FD        1A A4                       BCTR,N     *FOUTAD                                 00246600
2557  35FF        FB 79                       BDRR,R3     LOOP50                                 00246700
2558  3601        3F 34 AD                    BSTA,UN     ADNR                                   00246800
2559  3604        1A 9D                       BCTR,N     *FOUTAD                                 00246900
2560  3606        0F 1F 76                    LODA,R3     REGOA                                  00247000
2561  3609  3609  0F 3F 7A          LOOP51    LODA,R0     BUF5+D'-1',R3,+                        00247100
2562  360C        9E 35 74                    BCFA,N      TSTACC                                 00247200
2563  360F        1B 5E                       BCTR,UN     TSTOCT                                 00247300
2564                                ********************************************************** 00247400
2565  3611  3611  E4 20             BIT8DD    COMI,R0     H'20'  !!!!!!!!!!!!!!!!                00247500
2566  3613        98 07                       BCFR,Z      TSTPLO                                 00247600
2567  3615        04 FF                       LODI,R0     255                                    00247700
2568  3617        CC 1F DA                    STRA,R0     TEKEN                                  00247800
2569  361A        1B 6D                       BCTR,UN     LOOP51                                 00247900
2570                                ********************************************************** 00248000
2571  361C  361C  E4 2B             TSTPLO   COMI,R0     A'+'                                   00248100
2572  361E        18 69                       BCTR,Z      LOOP51                                 00248200
2573  3620        1F 35 74                    BCTA,UN     TSTACC                                 00248300
2574                                ********************************************************** 00248400
2575  3623  3623  36 EF             FOUTAD    ACON        CRTL1S                                 00248500
2576                                ********************************************************** 00248600
2577  3625  3625  05 03             DECSTR    LODI,R1     3                                      00248700
2578  3627        CD 1F F0                    STRA,R1     STRCON                                 00248800
2579  362A        05 00                       LODI,R1     0                                      00248900
2580  362C        06 00                       LODI,R2     0                                      00249000
2581  362E        EF 1F C3                    COMA,R3     CHACNT                                 00249100
2582  3631        9A F0                       BCFR,N     *FOUTAD                                 00249200
2583  3633        0F 3F 7A                    LODA,R0     BUF5+D'-1',R3,+                        00249300
2584  3635        9E 36 B7                    BCFA,N      BIT8DD                                 00249400
2585  3639  3639  A4 B0             TSTDEC    SUBI,R0     H'B0'                                  00249500
2586  363B        E4 09                       COMI,R0     9                                      00249600
2587  363D        19 E4                       BCTR,P     *FOUTAD                                 00249700
2588  363F        3F 34 97                    BSTA,UN     ROTA16                                 00249800
2589  3642        1A DF                       BCTR,N     *FOUTAD                                 00249900
2590  3644        CD 1F F1                     STRA,R1     DECMSB                                00250000
2591  3647        CE 1F F2                     STRA,R2     DECLSB                                00250100
2592  364A        3F 34 97                    BSTA,UN     ROTA16                                 00250200
2593  364D        1A D4                       BCTR,N     *FOUTAD                                 00250300
2594  364F        3F 34 97                    BSTA,UN     ROTA16                                 00250400
2595  3652        1A CF                       BCTR,N     *FOUTAD                                 00250500
2596  3654        8E 1F F2                    ADDA,R2     DECLSB                                 00250600
2597  3657        77 08                       PPSL        WC                                     00250700
2598  3659        80 1F F1                    ADDA,R1     DECMSB                                 00250800
2599  365C        75 08                       CPSL        WC                                     00250900
2600  365E        1A C3                       BCTR,N     *FOUTAD                                 00251000
2601  3660        3F 34 AD                    BSTA,UN     ADNR                                   00251100
2602  3663        1E 36 A6                    BCTA,N      BRFOUT                                 00251200
2603  3666  3666  0F 3F 7A          LOOP52    LODA,R0     BUF5+D'-1',R3,+                        00251300
2604  3669        9A 10                       BCFR,N      TSTMND                                 00251400
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

2605  3663        E4 B9                        COMI,R0        H'B9'                    00251500
2606  3665        99 4A                        BCFR,P         TSTOEC                   00251600
2607  3667  366F  0C 1F 7A           LOOP53     LODA,R0        BUF8                     00251700
2608  3672        E4 24                        COMI,R0        A'$'                     00251800
2609  3674        98 30                        BCFR,Z         BRFOUT                   00251900
2610  3676        A7 02                        SUBI,R3        2                        00252000
2611  3678        1F 35 79                     BCTA,UN        LOOP47                   00252100
2612                                           ************************************************************** 00252200
2613  367B  367B  E4 20           TSTMND     COMI,R0        H'20'                    00252300
2614  367D        18 04                        BCTR,Z         NXTCH1                   00252400
2615  367F        E4 2B                        COMI,R0        A'+'                     00252500
2616  3681        98 13                        BCFR,Z         COMPAC                   00252600
2617  3683  3683  87 01           NXTCH1     ADDI,R3        1                        00252700
2618  3685        18 68                        BCTR,UN        LOOP53                   00252800
2619                                           ************************************************************** 00252900
2620  3687  3687  E4 20           BIT800     COMI,R0        H'20'                    00253000
2621  3689        98 07                        BCFR,Z         TSTPLO                   00253100
2622  368B        04 FF                        LODI,R0        255                      00253200
2623  368D        CC 1F DA                     STRA,R0        TEKEN                    00253300
2624  3690        18 54                        BCTR,UN        LOOP52                   00253400
2625                                           ************************************************************** 00253500
2626  3692  3692  E4 2B           TSTPLO     COMI,R0        A'+'                     00253600
2627  3694        18 50                        BCTR,Z         LOOP52                   00253700
2628  3695  3696  E4 27           COMPAC     COMI,R0        A''''                    00253800
2629  3698        1C 35 79                     BCTA,Z         LOOP47                   00253900
2630  369B        E4 2C                        COMI,R0        A','                     00254000
2631  369D        18 0A                        BCTR,Z         VERG3                    00254100
2632  369F        0C 1F 7A                     LODA,R0        BUF8                     00254200
2633  36A2        E4 24                        COMI,R0        A'$'                     00254300
2634  36A4        18 0B                        BCTR,Z         CHARM1                   00254400
2635  36A6  36A6  1F 36 FF           BRFOUT     BCTA,UN        CRTL1S                   00254500
2636                                           ************************************************************** 00254600
2637  36A9  36A9  0C 1F 73           VERG3      LODA,R0        OPC1                     00254700
2638  36AC        E4 03                        COMI,R0        3                        00254800
2639  36AE        1C 35 7E                     BCTA,Z         LOOP48                   00254900
2640  36B1  36B1  A7 01           CHARM1     SUBI,R3        1                        00255000
2641  36B3        1F 35 79                     BCTA,UN        LOOP47                   00255100
2642                                           ************************************************************** 00255200
2643  36B5  36B5  EF 1F C3           ASCSTR     COMA,R3        CHACNT                   00255300
2644  36B9        9A 6B                        BCFR,N         BRFOUT                   00255400
2645  36BB        05 00                        LODI,R1        0                        00255500
2646  36BD  36BD  0F 3F 7A           LOOP55     LODA,R0        BUF5+0'-1',R3,+          00255600
2647  36C0        44 7F                        ANDI,R0        H'7F'                    00255700
2648  36C2        18 62                        BCTR,Z         BRFOUT                   00255800
2649  36C4        E4 27                        COMI,R0        A''''                    00255900
2650  36C6        18 0A                        BCTR,Z         ENOSTR                   00256000
2651  36C8  36C8  C0 3F F2           STBUF9     STRA,R0        BUF9+0'-1',R1,+          00256100
2652  36CB        E5 10                        COMI,R1        16                       00256200
2653  36CD        99 6E                        BCFR,P         LOOP55                   00256300
2654  36CF        1F 35 80                     BCTA,UN        CRTL2S                   00256400
2655                                           ************************************************************** 00256500
2656  36D2  36D2  0F 3F 7A           ENOSTR     LODA,R0        BUF5+0'-1',R3,+          00256600
```

```
LINE  ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

2657  3605        18 06                    BCTR,Z      KLSTRG                    00256700
2658  3607        E4 27                    COMI,R0     A''''                     00256800
2659  3609        98 02                    BCFR,Z      KLSTRG                    00256900
2660  360B        1B 68                    BCTR,UN     STBUF9                    00257000
2661                                 ********************************************************** 00257100
2662  360D  360D  CD 1F DB           KLSTRG   STRA,R1     STRLEN                    00257200
2663  360E        A7 01                    SUBI,R3     1                         00257300
2664  3610        CF 1F 75                 STRA,R3     CHARNR                    00257400
2665  3613  3613  0C 1F DB           KLAARS   LODA,R0     STRLEN                    00257500
2666  3616        18 05                    BCTR,Z      CRTL1S                    00257600
2667  3618        20                       EORZ        R0                        00257700
2668  3619  3619  CC 1F 29           STCRTL   STRA,R0     CRTL                      00257800
2669  361C        17                       RETC,UN                               00257900
2670                                 ********************************************************** 00258000
2671  361D  361D  04 01              CRTL1S   LODI,R0     1                         00258100
2672  361F        1B 78                    BCTR,UN     STCRTL                    00258200
2673                                 ********************************************************** 00258300
2674  3621  3621  04 FF              CRTFFS   LODI,R0     255                       00258400
2675  3623        1B 74                    BCTR,UN     STCRTL                    00258500
2676                                 ********************************************************** 00258600
2677  3625  3625  05 00              CALADR   LODI,R1     0                         00258700
2678  3627        0E 1F 72                 LODA,R2     COUNT2+1                  00258800
2679  362A        86 02                    ADDI,R2     2                         00258900
2680  362C        77 08                    PPSL        WC                        00259000
2681  362E        8D 1F 71                 ADDA,R1     COUNT2                    00259100
2682  3631        75 08                    CPSL        WC                        00259200
2683  3633        0C 1F D8                 LODA,R0     ABUF+1                    00259300
2684  3636        A2                       SUBZ        R2                        00259400
2685  3637        C2                       STRZ        R2                        00259500
2686  3638        0C 1F D7                 LODA,R0     ABUF                      00259600
2687  363B        77 08                    PPSL        WC                        00259700
2688  363D        A1                       SUBZ        R1                        00259800
2689  363E        C1                       STRZ        R1                        00259900
2690  3640  3640  75 08              RELMAX   CPSL        WC                        00260000
2691  3642        98 0C                    BCFR,Z      COM1FF                    00260100
2692  3644        E6 3F                    COMI,R2     H'3F'                     00260200
2693  3646        19 12                    BCTR,P      ROFF                      00260300
2694  3648  3648  0C 1F DE           INDBIT   LODA,R0     INDIR                     00260400
2695  364B        14                       RETC,Z                                00260500
2696  364C        66 80                    IORI,R2     H'80'                     00260600
2697  364E        20                       EORZ        R0                        00260700
2698  364F        17                       RETC,UN                               00260800
2699                                 ********************************************************** 00260900
2700  3650  3650  E5 FF              COM1FF   COMI,R1     255                       00261000
2701  3652        98 06                    BCFR,Z      ROFF                      00261100
2702  3654        46 7F                    ANDI,R2     H'7F'                     00261200
2703  3656        E6 40                    COMI,R2     H'40'                     00261300
2704  3658        9A 6E                    BCFR,N      INDBIT                    00261400
2705  365B  365B  04 FF              ROFF     LODI,R0     255                       00261500
2706  365D        17                       RETC,UN                               00261600
2707                                 ********************************************************** 00261700
2708                                         ORG         H'379C'                   00261800
```

```
ADDR  LABL  B1 B2 B3 B4 ERROR SOURCE

                          ********************************************************************************  00261900
379C  379C  CA 00 00 00   EQLST           DATA        H'CA,00,00,00,00'                                    00262000
            00
37A1        CA 10 00 00                   DATA        H'CA,10,00,00,01'                                    00262100
            01
37A5        CA 20 00 00                   DATA        H'CA,20,00,00,02'                                    00262200
            02
37AB        CA 30 00 00                   DATA        H'CA,30,00,00,03'                                    00262300
            03
37B0        DC 30 00 00                   DATA        H'DC,30,00,00,08'                                    00262400
            08
37B5        C9 30 00 00                   DATA        H'C9,30,00,00,10'                                    00262500
            10
37BA        8C F3 40 00                   DATA        H'8C,F3,40,00,02'                                    00262600
            02
37BF        8C 14 80 00                   DATA        H'8C,14,80,00,01'                                    00262700
            01
37C4        CC 53 93 00                   DATA        H'CC,53,93,00,80'                                    00262800
            80
37C9        98 C0 47 00                   DATA        H'98,C0,47,00,40'                                    00262900
            40
37CE        A4 90 00 00                   DATA        H'A4,90,00,00,20'                                    00263000
            20
37D3        A4 40 C0 00                   DATA        H'A4,40,C0,00,20'                                    00263100
            20
37D8        BD 61 80 00                   DATA        H'BD,61,80,00,04'                                    00263200
            04
37DD        E8 00 00 00                   DATA        H'E8,00,00,00,00'                                    00263300
            00
37E2        C0 00 00 00                   DATA        H'C0,00,00,00,01'                                    00263400
            01
37E7        B8 00 00 00                   DATA        H'B8,00,00,00,02'                                    00263500
            02
37EC        95 10 00 00                   DATA        H'95,10,00,00,00'                                    00263600
            00
37F1        9D 40 00 00                   DATA        H'9D,40,00,00,01'                                    00263700
            01
37F6        B1 40 00 00                   DATA        H'B1,40,00,00,02'                                    00263800
            02
37FB        D4 E0 00 00                   DATA        H'D4,E0,00,00,D3'                                    00263900
            03
                          ********************************************************************************  00264000
                                          END         H'2200'                                              00264100
```

```
F ASSEMBLER ERRORS =     1    (TOTAL =     1)
F BYTES GENERATED  =  5448    (TOTAL =  5448)
F CARDS READ       =  2640    (TOTAL =  2640)
```

```
LINE ADDR  OBJECT  E SOURCE

0001                                    * EERSTE HELFT
0002                                    * PROMETHEUS
0003                                    * RESIDENT
0004                                    * ASSEMBLER
0005                    *
0006                    * 3800-3F21 LABEL BUFFER
0007                    * 3F22
0008                    * 3F23      PRINT FLAG
0009                    * 3F24      FLAG3
0010                    * 3F25-3F28 BUF3 (4) ERROR BUFFER
0011                    * 3F29      CRTL
0012                    * 3F2A-3F2D BUF8 (4) NIET COMPRESSED LABEL
0013                    * 3F2E-3F30 BUF6 (3) COMPRESSED LABEL
0014                    * 3F31      COUNT2
0015                    * 3F32      COUNT2+1
0016                    * 3F33      NRERR  AANTAL ASSEMBLY ERRORS (BIN)
0017                    * 3F34      START ADRES OBJECT CODE
0018                    * 3F35      STADD+1
0019                    * 3F36      PAGE COUNT
0020                    * 3F37      LINENR
0021                    * 3F38      LINENR+1
0022                    * 3F39      ADDRES
0023                    * 3F3A      ADDRES+1
0024                    * 3F3B      ENDFLG
0025                    * 3F3C      PASS
0026                    * 3F3D      MAXLAB  MAX AANTAL LABELS
0027                    * 3F3E      MAXLAB+1
0028                    * 3F3F      LSTLAB LAST LABEL ADRES
0029                    * 3F40      LSTLAB+1
0030                    * 3F41      LANR
0031                    * 3F42      LANR+1
0032                    * 3F43      POINT4
0033                    * 3F44      POINT4+1
0034                    * 3F45-3F6C BUF1 (40)  TITLE BUFFER
0035                    * 3F6D      TEL1
0036                    * 3F6E      TEL1+1
0037                    * 3F6F      CRTL1
0038                    * 3F70      POINT5
0039                    * 3F71      POINT5+1
0040                    * 3F72      ADRTYP
0041                    * 3F73      OPC1
0042                    * 3F74      LINPAG  NR OF LINES PER PAG (COUNTING DOWN)
0043                    * 3F75      CHARNR
0044                    * 3F76      REG0A
0045                    * 3F77      REG3A
0046                    * 3F78      REG2A
0047                    * 3F79      REG1A
0048                    * 3F7A      REGOBJ  AANTAL OBJ BYTES OP EEN REGEL
0049                    * 3F7B-3FC2 BUF5 (72) SOURCE CODE BUFFER
0050                    * 3FC3      CHACNT  AANTAL CHAR IN BUF5
0051                    * 3FC4      LABADR
0052                    * 3FC5      LABADR+1
0053                    * 3FC6      BYTCOD  AANTAL BYTES IN CODE
0054                    * 3FC7      BYTE 1
0055                    * 3FC8      BYTE 2
0056                    * 3FC9      BYTE 3
```

```
LINE ADDR  OBJECT  E SOURCE

0057                    * 3FCA-3FD6 BUF4 (13)  OBJECT CODE BUFFER
0058                    * 3FD7      ABUF    RELATIEF ADRES?
0059                    * 3FD8      ABUF+1
0060                    * 3FD9      NEGCON  =FF ALS - VOORKOMT
0061                    * 3FDA      TEKEN
0062                    * 3FDB      STRLEN  LENGTE STRING
0063                    * 3FDC      SRCPNT  SOURCE POINTER
0064                    * 3FDD      CONTRL
0065                    * 3FDE      INDIR   =01 ALS * VOORKOMT
0066                    * 3FDF      HAAK    =FF BIJ >, =00 BIJ <, ANDERS =01
0067                    * 3FE0      STRCON  STRING CONTROL 0=BIN,1=HEX,2=OCT,3=DE
0068                    * 3FE1      DECMSB  MSB DECIMAAL BYTE
0069                    * 3FE2      DECLSB
0070                    * 3FE3-3FF4 BUF9
0071                    * 3FF5-3FF8 BCDBUF
0072                    * 3FF9
0073                    * 3FFA      REG2
0074                    * 3FFB      REG3
0075                    * 3FFC      DATA
0076                    * 3FFD      NREVTS
0077                    * 3FFE      CHECK
0078                    * 3FFF      CHSTOR
0079                    ************************************************************
0080 0000               R0      EQU     0
0081 0001               R1      EQU     1
0082 0002               R2      EQU     2
0083 0003               R3      EQU     3
0084 0000               Z       EQU     0
0085 0001               P       EQU     1
0086 0002               N       EQU     2
0087 0003               UN      EQU     3
0088 2E39               WRCHAR  EQU     H'2E39'
0089 2E0F               LEESCH  EQU     H'2E0F'
0090 30A3               HEADER  EQU     H'30A3'
0091 2F53               ENTTAP  EQU     H'2F53'
0092 31BC               GETLAB  EQU     H'31BC'
0093 2E9A               LABEL   EQU     H'2E9A'
0094 2EF2               FILAB   EQU     H'2EF2'
0095 3061               PT4PL2  EQU     H'3061'
0096 3076               INCERR  EQU     H'3076'
0097 314B               BINBCD  EQU     H'314B'
0098 31A1               PRBCD   EQU     H'31A1'
0099 3345               CONTST  EQU     H'3345'
0100 2EDA               DMPOBJ  EQU     H'2EDA'
0101 2FC0               ENDREG  EQU     H'2FC0'
0102 307E               INCCNT  EQU     H'307E'
0103 34B4               STRING  EQU     H'34B4'
0104 2E06               LF      EQU     H'2E06'
0105 30AA               NEWPAG  EQU     H'30AA'
0106 3088               INCLIN  EQU     H'3088'
0107 3208               PRLIN   EQU     H'3208'
0108 2E00               CRLF    EQU     H'2E00'
0109 36F7               CALADR  EQU     H'36F7'
0110 3711               RELMAX  EQU     H'3711'
0111 0000                       ORG     H'3800'
0112 3800               LABUF   RES     H'722'
```

```
LINE ADDR  OBJECT  E SOURCE

0113 3F22                    RES     1
0114 3F23              PRFLAG RES     1
0115 3F24              FLAG3  RES     1
0116 3F25              BUF3   RES     4
0117 3F29              CRTL   RES     1
0118 3F2A              BUF8   RES     4
0119 3F2E              BUF6   RES     3
0120 3F31              COUNT2 RES     2
0121 3F33              NRERR  RES     1
0122 3F34              STADD  RES     2
0123 3F36              PAGCNT RES     1
0124 3F37              LINENR RES     2
0125 3F39              ADDRES RES     2
0126 3F3B              ENDFLG RES     1
0127 3F3C              PASS   RES     1
0128 3F3D              MAXLAB RES     2
0129 3F3F              LSTLAB RES     2
0130 3F41              LANR   RES     2
0131 3F43              POINT4 RES     2
0132 3F45              BUF1   RES     40
0133 3F6D              TEL1   RES     2
0134 3F6F              CRTL1  RES     1
0135 3F70              POINT5 RES     2
0136 3F72              ADRTYP RES     1
0137 3F73              OPC1   RES     1
0138 3F74              LINPAG RES     1
0139 3F75              CHARNR RES     1
0140 3F76              REG0A  RES     1
0141 3F77              REG3A  RES     1
0142 3F78              REG2A  RES     1
0143 3F79              REG1A  RES     1
0144 3F7A              REGOBJ RES     1
0145 3F7B              BUF5   RES     72
0146 3FC3              CHACNT RES     1
0147 3FC4              LABADR RES     2
0148 3FC6              BYTCOD RES     1
0149 3FC7              BYTE1  RES     1
0150 3FC8              BYTE2  RES     1
0151 3FC9              BYTE3  RES     1
0152 3FCA              BUF4   RES     13
0153 3FD7              ABUF   RES     2
0154 3FD9              NEGCON RES     1
0155 3FDA              TEKEN  RES     1
0156 3FDB              STRLEN RES     1
0157 3FDC              SREPNT RES     1
0158 3FDD              CONTRL RES     1
0159 3FDE              INDIR  RES     1
0160 3FDF              HAAK   RES     1
0161 3FE0              STRCON RES     1
0162 3FE1              DECMSB RES     1
0163 3FE2              DECLSB RES     1
0164 3FE3              BUF9   RES     18
0165 3FF5              BCDBUF RES     4
0166 3FF9                     RES     1
0167 3FFA              REG2   RES     1
0168 3FFB              REG3   RES     1
```

```
LINE ADDR  OBJECT  E SOURCE

0169 3FFC             DATAS  RES     1
0170 3FFD             NRBYTS RES     1
0171 3FFE             CHECK  RES     1
0172 3FFF             CHSTOR RES     1
0173                  ********************************************************************
0174                  * PROMETHEUS RESIDENT 2650 ASSEMBLER
0175 4000                    ORG     H'2200'
0176 2200 0480        TTYIN  LODI,R0 H'80'
0177 2202 1B02               BCTR,UN SPRFL
0178 2204 0400        FPTR   LODI,R0 0
0179 2206 CC1F23      SPRFL  STRA,R0 PRFLAG
0180 2209 7407               CPSU    H'07'
0181 220B 7702               PPSL    H'02'
0182 220D 7508               CPSL    H'08'
0183 220F 0728               LODI,R3 40
0184 2211 0F4BA3      LOOP1  LODA,R0 MES1,R3,-      "PROMETHEUS RESIDENT ASSEMB
0185 2214 3F2E39             BSTA,UN WRCHAR
0186 2217 5B78               BRNR,R3 LOOP1
0187 2219 070B        PRPASS LODI,R3 11
0188 221B 0F4BCB      LOOP3  LODA,R0 MES2,R3,-      "PASS = "
0189 221E 3F2E39             BSTA,UN WRCHAR
0190 2221 5B78               BRNR,R3 LOOP3
0191 2223 3F2E0F             BSTA,UN LEESCH  CHAR IN R0
0192 2226 3F2E39             BSTA,UN WRCHAR  ECHO CHAR
0193 2229 A430               SUBI,R0 H'30'
0194 222B 996C               BCFR,P  PRPASS  CONTROL CHAR?
0195 222D E403               COMI,R0 3
0196 222F 1B68               BCTR,P  PRPASS  CHAR > 3 OF LETTER
0197 2231 CC1F3C             STRA,R0 PASS
0198 2234 E401               COMI,R0 1       PASS 1?
0199 2236 9C229C             BCFA,Z  PASS2
0200 2239 0711               LODI,R3 17
0201 223B 0F4BF3      LOOP4  LODA,R0 MES4+1,R3,-    "IDENTIFICATION",
0202 223E 3F2E39             BSTA,UN WRCHAR
0203 2241 5B78               BRNR,R3 LOOP4
0204 2243 3F2E0F      LOOP5  BSTA,UN LEESCH
0205 2246 3F2E39             BSTA,UN WRCHAR  ECHO CHAR
0206 2249 E40D               COMI,R0 H'0D'   EINDE REGEL?
0207 224B 9876               BCFR,Z  LOOP5
0208 224D 046D               LODI,R0 H'6D'
0209 224F 0701               LODI,R3 H'01'
0210 2251 CE1F3D             STRA,R3 MAXLAB
0211 2254 CC1F3E             STRA,R0 MAXLAB+1
0212 2257 0482               LODI,R0 H'82'
0213 2259 0701               LODI,R3 H'01'
0214 225B CE1F3F             STRA,R3 LSTLAB
0215 225E CC1F40             STRA,R0 LSTLAB+1
0216 2261 0538               LODI,R1 H'38'
0217 2263 CD1F43             STRA,R1 POINT4
0218 2266 20                 EORZ    R0
0219 2267 CC1F44             STRA,R0 POINT4+1
0220 226A CD1F70             STRA,R1 POINT5
0221 226D CC1F71             STRA,R0 POINT5+1
0222 2270 C1                 STRZ    R1
0223 2271 C2                 STRZ    R2
0224 2272 047B        LOOP6  LODI,R0 H'7B'   SCHRIJF H'7B' VAN 3800-3F21
```

```
LINE ADDR  OBJECT  E SOURCE

0225 2274 CC9F43            STRA,R0 *POINT4
0226 2277 DA02              BIRR,R2 INCREG
0227 2279 D900              BIRR,R1 INCREG
0228 227B E621      INCREG  COMI,R2 H'21'
0229 227D 9804              BCFR,Z  INCPT4
0230 227F E507              COMI,R1 H'07'
0231 2281 1812              BCTR,Z  KLRCLR  KLAAR CLEAR
0232 2283 0F1F43    INCPT4  LODA,R3 POINT4
0233 2286 0C1F44            LODA,R0 POINT4+1
0234 2289 D802              BIRR,R0 STPT4
0235 228B DB00              BIRR,R3 STPT4
0236 228D CC1F44    STPT4   STRA,R0 POINT4+1
0237 2290 CF1F43            STRA,R3 POINT4
0238 2293 1B5D              BCTR,UN LOOP6
0239                ********************************************************************
0240 2295 20        KLRCLR  EORZ    R0
0241 2296 CC1F41            STRA,R0 LANR
0242 2299 CC1F42            STRA,R0 LANR+1
0243 229C 0538      PASS2   LODI,R1 H'38'
0244 229E 0600              LODI,R2 0
0245 22A0 0700              LODI,R3 0
0246 22A2 CF1F6D    LOOP7   STRA,R3 TEL1
0247 22A5 CD1F43    LOOP8   STRA,R1 POINT4
0248 22A8 CE1F44            STRA,R2 POINT4+1
0249 22AB 0C9F43            LODA,R0 *POINT4
0250 22AE 447F              ANDI,R0 H'7F'   REMOVE PARITY
0251 22B0 CC9F43            STRA,R0 *POINT4
0252 22B3 0605              ADDI,R2 5       POINT4+5
0253 22B5 7708              PPSL    H'08'   WITH CARRY
0254 22B7 0500              ADDI,R1 0
0255 22B9 7508              CPSL    H'08'
0256 22BB DB0A              BIRR,R3 GNCR    SEEN CARRY
0257 22BD 0F1F6D            LODA,R3 TEL1
0258 22C0 0701              ADDI,R3 1
0259 22C2 CF1F6D            STRA,R3 TEL1
0260 22C5 0700              LODI,R3 0
0261 22C7 EF1F3E    GNCR    COMA,R3 MAXLAB+1
0262 22CA 9859              BCFR,Z  LOOP8
0263 22CC CF1F6E            STRA,R3 TEL1+1
0264 22CF 0F1F6D            LODA,R3 TEL1
0265 22D2 EF1F3D            COMA,R3 MAXLAB
0266 22D5 1806              BCTR,Z  KLR1
0267 22D7 0F1F6E            LODA,R3 TEL1+1
0268 22DA 1F22A5            BCTA,UN LOOP8
0269                ********************************************************************
0270 22DD 0C1F3C    KLR1    LODA,R0 PASS
0271 22E0 E402              COMI,R0 2
0272 22E2 1908              BCTR,P  PASS3
0273 22E4 0420              LODI,R0 A' '
0274 22E6 0728      LOOP9   LODI,R3 H'28'
0275 22E8 CF5F45    LOOP10  STRA,R0 BUF1,R3,-       STORE 40 BLANKS
0276 22EB 5B7B              BRNR,R3 LOOP10
0277 22ED 1B16              BCTR,UN LOOP11
0278                ********************************************************************
0279 22EF 20        PASS3   EORZ    R0
0280 22F0 CC1F24            STRA,R0 FLAG3
```

```
LINE ADDR  OBJECT  E SOURCE

0281 22F3 0724              LODI,R3 36
0282 22F5 0F4630    LOOP12  LODA,R0 MES7,R3,
0283 22F8 3F2E39            BSTA,UN WRCHAR  "TURN ON PUNCH AND TYPE A CHARACTER
0284 22FB 5B78              BRNR,R3 LOOP12
0285 22FD 3F2E0F            BSTA,UN LEESCH
0286 2300 3F30A3            BSTA,UN HEADER  PONS HEADER
0287 2303 1B61              BCTR,UN LOOP9
0288                        ********************************************************
0289 2305 20        LOOP11  EORZ    R0      INITIALISEER DIVERSE TELLERS EN BUF
0290 2306 070B              LODI,R3 11
0291 2308 CF5F31    LOOP13  STRA,R0 COUNT2,R3,-
0292 230B 5B7B              BRNR,R3 LOOP13
0293 230D 0420      BLKBF3  LODI,R0 A' '
0294 230F 0704              LODI,R3 4
0295 2311 CF5F25    LOOP14  STRA,R0 BUF3,R3,-
0296 2314 5B7B              BRNR,R3 LOOP14
0297 2316 20                EORZ    R0
0298 2317 0715              LODI,R3 21
0299 2319 CF5FC4    LOOP15  STRA,R0 LABADR,R3,-
0300 231C 5B7B              BRNR,R3 LOOP15  CLEAR OBJECT BUFFER
0301 231E 3F2F53            BSTA,UN ENTTAP
0302 2321 CC1F7B            STRA,R0 CHARNR  R0=0 NA ENTTAP
0303 2324 0C1F7B            LODA,R0 BUF5
0304 2327 E42A              COMI,R0 A'*'    COMMENT?
0305 2329 1C2B4C            BCTA,Z  STAR
0306 232C E420              COMI,R0 A' '
0307 232E 1C23FA            BCTA,Z  GEENLA  GEEN LABEL
0308 2331 3F318C            BSTA,UN GETLAB  LABEL IN BUF8
0309 2334 9C2AB7            BCFA,Z  LABERR  ALS NA LABEL GEEN BLANK,FOUT
0310 2337 3F2E26            BSTA,UN LABEL   COMPRESS LABEL
0311 233A 0C1F29            LODA,R0 CRTL
0312 233D 9C2AB7            BCFA,Z  LABERR  FOUT BIJ COMPRESSIE LABEL?
0313 2340 3F2EF2            BSTA,UN FILAB
0314 2343 0C1F7C            LODA,R0 PASS
0315 2346 0E1F44            LODA,R2 POINT4+1
0316 2349 0C1F43            LODA,R1 POINT4
0317 234C E5FF              COMI,R1 H'FF'   R1=FF ALS LABEL NIET GEVONDEN
0318 234E 1826              BCTR,Z  LABPLS  VOEG LABEL TOE
0319 2350 5401              COMI,R0 1       PASS1 ?
0320 2352 1828              BCTR,Z  MULTER
0321 2354 CD1FC4            STRA,R1 LABADR
0322 2357 CE1FC5            STRA,R2 LABADR+1
0323 235A 0C3F43            LODA,R0 *POINT4
0324 235D 1A1D              BCTR,N  MULTER  ALS BIT 8=1 LABEL AL GEHAD
0325 235F 6480              IORI,R0 H'80'
0326 2361 CC3F43            STRA,R0 *POINT4
0327 2364 3F30E1            BSTA,UN PT4PL2  POINT4+2
0328 2367 0702              LODI,R3 2
0329 2369 0FFF43    LOOP16  LODA,R0 *POINT4,R3
0330 236C EF5F31            COMA,R0 COUNT2,R3,-
0331 236F 9604              BCFR,Z  PASS1
0332 2371 5B7B              BRNR,R3 LOOP16
0333 2373 1804              BCTR,UN BRGNLA
0334 2375 20        PASS1   EORZ    R0
0335 2376 CC1F29            STRA,R0 BUF3
0336 2379 1F23FA    BRGNLA  BCTA,UN GEENLA
```

```
LINE ADDR  OBJECT  E SOURCE

0337                       ************************************************************
0338 237C 044D        MULTER LODI,R0 A'M'
0339 237E CC1F25             STRA,R0 BUF3
0340 2381 3F3076             BSTA,UN INCERR  INCREMENT NUMBER OF ERRORS
0341 2384 1B73               BCTR,UN BRGNLA
0342                       ************************************************************
0343 2386 0D1F41      LABPL5 LODA,R1 LANR
0344 2389 1E23F5             BCTA,N  FULERR  ALS LABELNR NEG,LABEL BUFFER VOL
0345 238C 0E1F42             LODA,R2 LANR+1
0346 238F EE1F3E             COMA,R2 MAXLAB+1
0347 2392 9828               BCFR,Z  ADDLAB
0348 2394 ED1F3D             COMA,R1 MAXLAB  LABEL BUFFER VOL?
0349 2397 9823               BCFR,Z  ADDLAB
0350 2399 6580               IORI,R1 H'80'   LABEL NR NEG
0351 239B CD1F41             STRA,R1 LANR
0352 239E 071D               LODI,R3 29
0353 23A0 0F4003      LOOP17 LODA,R0 MES5,R3,-       "SYMBOL TABLE FULL AT LINE
0354 23A3 3F2E39             BSTA,UN WRCHAR
0355 23A6 5B78               BRNR,R3 LOOP17
0356 23A8 0D1F37             LODA,R1 LINENR
0357 23AB 0C1F38             LODA,R0 LINENR+1
0358 23AE D802               BIRR,R0 LINEP1
0359 23B0 D900               BIRR,R1 LINEP1
0360 23B2 3F314B      LINEP1 BSTA,UN BINBCD
0361 23B5 0704               LODI,R3 4
0362 23B7 3F31A1             BSTA,UN PRBCD   PRINT LINE NR
0363 23BA 1B3E               BCTR,UN GEENLA
0364                       ************************************************************
0365 23BC DA02        ADDLAB BIRR,R2 INLANR
0366 23BE D900               BIRR,R1 INLANR
0367 23C0 CD1F41      INLANR STRA,R1 LANR
0368 23C3 CE1F42             STRA,R2 LANR+1
0369 23C6 E401               COMI R0 1       PASS 1?
0370 23C8 982B               BCFR,Z  FULERR  ALS LABEL NIET MERKEND IN PASS 2 OF
0371 23CA 0705               LODI,R3 5
0372 23CC 0C1F71             LODA,R0 POINT5+1
0373 23CF CC1F44             STRA,R0 POINT4+1
0374 23D2 CC1FC5             STRA,R0 LABADR+1
0375 23D5 83                 ADDZ    R3
0376 23D6 CC1F71             STRA,R0 POINT5+1
0377 23D9 0C1F70             LODA,R0 POINT5
0378 23DC CC1F43             STRA,R0 POINT4
0379 23DF CC1FC4             STRA,R0 LABADR
0380 23E2 7708               PPSL    H'08'
0381 23E4 8400               ADDI,R0 0
0382 23E6 7508               CPSL    H'08'
0383 23E8 CC1F70             STRA,R0 POINT5
0384 23EB 0F5F2E      LOOP18 LODA,R0 BUF6,R3,
0385 23EE CFFF43             STRA,R0 *POINT4,R3      STORE LABEL IN LABEL BUFFER
0386 23F1 5B7B               BRNR,R3 LOOP18
0387 23F3 1B05               BCTR,UN GEENLA
0388                       ************************************************************
0389 23F5 0446        FULERR LODI,R0 A'F'
0390 23F7 CC1F25             STRA,R0 BUF3    ERROR F
0391 23FA 3F2FC0      GEENLA BSTA,UN ENDREG
0392 23FD 9C2AE1             BCFA,Z  OPCERR
```

```
LINE ADDR  OBJECT  E SOURCE

0393 2400 3F31BC            BSTA,UN GETLAB
0394 2403 9905              BCFR,P  GEENCT  GEEN CONTROL
0395 2405 E42C              COMI,R0 A','    ALLEEN , NA OPCODE IS MOGELIJK
0396 2407 9C2AE1            BCFA,Z  OPCERR
0397 240A CD1F6F    GEENCT  STRA,R1 CRTL1
0398 240D 0504              LODI,R1 4
0399 240F 0D5F2A    LOOP19  LODA,R0 BUF8,R1,-       NIET COMPRESSED OPCODE
0400 2412 E441              COMI,R0 A'A'
0401 2414 1A04              BCTR,N  BLNK    OPCODE MAG ALLEEN CHAR OF BLANK BEV
0402 2416 5977              BRNR,R1 LOOP19
0403 2418 1B05              BCTR,UN SUB40
0404                        ********************************************************
0405 241A E420      BLNK    COMI,R0 A' '    BLANK IS AFSLUITING OPCODE
0406 241C 9C2AE1            BCFA,Z  OPCERR  ALS GEEN BLANK EN GEEN CHAR,DAN FOU
0407 241F 0504      SUB40   LODI,R1 4
0408 2421 0D5F2A    LOOP60  LODA,R0 BUF8,R1,-
0409 2424 A440              SUBI,R0 H'40'
040A 2426 9A01              BCFR,N  NOBLK
040B 2428 20                EORZ    R0      BLANK WORDT 00
040C 2429 CD7F2A    NOBLK   STRA,R0 BUF8,R1
040D 242C 5973              BRNR,R1 LOOP60
040E 242E 0D1F2A            LODA,R1 BUF8
040F 2431 D1                RRL,R1
0410 2432 D1                RRL,R1
0411 2433 D1                RRL,R1          COMPRESS OPCODE EN STORE IN BUF6
0412 2434 0C1F2B            LODA,R0 BUF8+1
0413 2437 C2                STRZ    R2
0414 2438 50                RRR,R0
0415 2439 50                RRR,R0
0416 243A 4407              ANDI,R0 H'07'
0417 243C 81                ADDZ    R1
0418 243D CC1F2E            STRA,R0 BUF6
0419 2440 4603              ANDI,R2 H'03'
041A 2442 52                RRR,R2
041B 2443 52                RRR,R2
041C 2444 0C1F2C            LODA,R0 BUF8+2
041D 2447 D0                RRL,R0
041E 2448 82                ADDZ    R2
041F 2449 0D1F2D            LODA,R1 BUF8+3
0420 244C F501              TMI,R1  H'01'
0421 244E 9802              BCFR,Z  STRLB
0422 2450 8401              ADDI,R0 1
0423 2452 CC1F2F    STRLB   STRA,R0 BUF6+1
0424 2455 D1                RRL,R1
0425 2456 D1                RRL,R1
0426 2457 D1                RRL,R1
0427 2458 D1                RRL,R1
0428 2459 45F0              ANDI,R1 H'F0'
0429 245B CD1F30            STRA,R1 BUF6+2
042A 245E 0700              LODI,R3 0
042B 2460 E758      LOOP61  COMI,R3 H'58'   VERTAAL COMPRESSED OPCODE IN GETAL
042C 2462 1D2AE1            BCTA,P  OPCERR  TUSSEN 0 EN H'58'
042D 2465 0F6C54            LODA,R0 ROMDA1,R3
042E 2468 EC1F2E            COMA,R0 BUF6
042F 246B 9812              BCFR,Z  NXTTRY
0430 246D 0F6CAD            LODA,R0 ROMDA2,R3
```

```
LINE ADDR  OBJECT  E SOURCE

0449 2470 EC1F2F            COMA,R0 BUF6+1
0450 2473 980A              BCFR,Z  NXTTRY
0451 2475 0F6D06            LODA,R0 ROMDA3,R3
0452 2478 44F0              ANDI,R0 H'F0'
0453 247A EC1F30            COMA,R0 BUF6+2
0454 247D 1804              BCTR,Z  FNDOPC
0455 247F 8701      NXTTRY  ADDI,R3 1
0456 2481 1B5D              BCTR,UN LOOP61
0457                        ********************************************************************
0458 2483 0F6D06    FNDOPC  LODA,R0 ROMDA3,R3
0459 2486 C1                STRZ    R1
0460 2487 450F              ANDI,R1 H'0F'
0461 2489 CD1F72            STRA,R1 ADRTYP
0462 248C E501              COMI,R1 1
0463 248E 1806              BCTR,Z  EENBYT
0464 2490 0C1F25            LODA,R0 BUF3
0465 2493 3C2ADA            BSTA,Z  FFERR   FASE ERROR
0466 2496 0F6D5F    EENBYT  LODA,R0 ROMDA4,R3
0467 2499 CC1F73            STRA,R0 OPC1
0468 249C D1                RRL,R1
0469 249D 0D64B0            LODA,R0 ROMDA5-2,R1
0470 24A0 CC1F43            STRA,R0 POINT4
0471 24A3 0D24B0            LODA,R0 ROMDA5-2,R1,+
0472 24A6 CC1F44            STRA,R0 POINT4+1
0473 24A9 0F1F3C            LODA,R3 PASS
0474 24AC 0E1F6F            LODA,R2 CRTL1
0475 24AF 1FBF43            BCTA,UN *POINT4
0476                        ********************************************************************
0477 24B2 24CA      ROMDA5  ACON    ASMDIR  ASSEMBLER DIRECTIVES
0478 24B4 27F8              ACON    DIV1BT  DIVERSE 1 BYTE INSTRUCTIES
0479 24B6 280D              ACON    BT1REG  1 BYTE REGISTER INSTR (RRL,R1)
0480 24B8 2850              ACON    IMMED   IMMEDIATE ADDRESSING
0481 24BA 2850              ACON    IMMED   RELATIEVE ADRESSERING
0482 24BC 28EF              ACON    ABSOL   ABSOLUTE ADRESSERING LOAD
0483 24BE 28EF              ACON    ABSOL   ABSOLUTE ADRESSERING BRANCH
0484 24C0 2A03              ACON    ZERINS  ZERO INSTRUCTIES
0485 24C2 2A1C              ACON    PSW2BT  PROG STAT WORD INSTR (2 BYTES)
0486 24C4 2A2D              ACON    ZBRRSR  ZBRR EN ZBSR-INSTRUCTIES
0487 24C6 2A50              ACON    BXASXA  BXA EN BSXA INSTRUCTIES
0488 24C8 2A50              ACON    BXASXA
0489                        ********************************************************************
0490 24CA 1D2AE1    ASMDIR  BCTA,P  OPCERR
0491 24CD 0D1F73            LODA,R1 OPC1
0492 24D0 981E              BCFR,2  TSTR11
0493 24D2 0C1F25    LODERB  LODA,R0 BUF3
0494 24D5 9805              BCFR,2  FOUTA
0495 24D7 0420              LODI,R0 A' '
0496 24D9 CC1F25            STRA,R0 BUF3
0497 24DC D1        FOUTA   RRL,R1
0498 24DD 0D64FC            LODA,R0 ROMDA6,R1
0499 24E0 CC1F43            STRA,R0 POINT4
0500 24E3 0D24FC            LODA,R0 ROMDA6,R1,+
0501 24E6 CC1F44            STRA,R0 POINT4+1
0502 24E9 4703              ANDI,R3 H'03'
0503 24EB E6FF              COMI,R2 H'FF'
0504 24ED 1FBF43            BCTA,UN *POINT4
```

```
LINE ADDR  OBJECT  E SOURCE

0505 24F0 E501        TSTR11 COMI,R1 1
0506 24F2 185E               BCTR,Z  LODERB
0507 24F4 0C1F25             LODA,R0 BUF3
0508 24F7 3C2ADA             BSTA,Z  FFERR
0509 24FA 1856               BCTR,UN LODERB
0510                  ********************************************************************
0511 24FC 2514        ROMDA6 ACON    ORGINS
0512 24FE 2563               ACON    EQUINS
0513 2500 2586               ACON    ENDINS
0514 2502 260E               ACON    DATAIN
0515 2504 2685               ACON    RESINS
0516 2506 26C8               ACON    EJEINS
0517 2508 26EA               ACON    ACONIN
0518 250A 2711               ACON    SPCINS
0519 250C 273B               ACON    PRTINS
0520 250E 276C               ACON    PCHINS
0521 2510 27A0               ACON    TITLIN
05   2512 27C6               ACON    LIBRIN
05                    ********************************************************************
0524 2514 1C2AF4      ORGINS BCTA,Z  AERR0
0525 2517 3F3345             BSTA,UN CONTST
0526 251A 1E2B11             BCTA,N  UERR0
0527 251D 1D2AF4             BCTA,P  AERR0
0528 2520 3C2FDA             BSTA,Z  DMPOBJ
0529 2523 0D1FD7             LODA,R1 ABUF
0530 2526 1E2AF4             BCTA,N  AERR0
0531 2529 0E1FD8             LODA,R2 ABUF+1
0532 252C CD1F31             STRA,R1 COUNT2
0533 252F CE1F32             STRA,R2 COUNT2+1
0534 2532 CD1F39             STRA,R1 ADDRES
0535 2535 CE1F3A             STRA,R2 ADDRES+1
0536 2538 CD1F34             STRA,R1 STADD
0537 253B CE1F35             STRA,R2 STADD+1
0538 253E 0C1FC4             LODA,R0 LABADR
0539 2541 181D               BCTR,Z  BRSTR1
0540 2543 0F1F25      MULTY  LODA,R3 BUF3
05   2546 E74D               COMI,R3 A'M'
0542 2548 1816               BCTR,Z  BRSTR1
0543 254A CC1F43             STRA,R0 POINT4
0544 254D 0C1FC5             LODA,R0 LABADR+1
0545 2550 CC1F44             STRA,R0 POINT4+1
0546 2553 3F3061             BSTA,UN PT4PL2
0547 2556 0702               LODI,R3 2
0548 2558 0F7F38      LOOP62 LODA,R0 ADDRES-1,R3
0549 255B CFFF43             STRA,R0 *POINT4,R3
0550 255E FB78               BDRR,R3 LOOP62
0551 2560 1F2B4C      BRSTR1 BCTA,UN STAR
0552                  ********************************************************************
0553 2563 1C2AF4      EQUINS BCTA,Z  AERR0
0554 2566 3F3345             BSTA,UN CONTST
0555 2569 1E2B11             BCTA,N  UERR0
0556 256C 1D2AF4             BCTA,P  AERR0
0557 256E 0D1FD7             LODA,R1 ABUF
0558 2572 0E1FD8             LODA,R2 ABUF+1
0559 2575 CD1F39             STRA,R1 ADDRES
0560 2578 CE1F3A             STRA,R2 ADDRES+1
```

```
LINE ADDR  OBJECT  E SOURCE

0561 257B 0500              LODI,R1 0
0562 257D 0C1FC4            LODA,R0 LABADR
0563 2580 1C2AD1            BCTA,Z  LERR0
0564 2583 1F2543            BCTA,UN MULTY
0565                        ************************************************************
0566 2586 CD1F3B      ENDINS STRA,R1 ENDFLG
0567 2589 181F              BCTR,Z  BRSTAR
0568 258B 3F2FC0            BSTA,UN ENDREG
0569 258E 9C25AA            BCFA,Z  BRSTAR
0570 2591 3F3345            BSTA,UN CONTST
0571 2594 1907              BCTR,P  AERR22
0572 2596 1A15              BCTR,N  UERR22
0573 2598 0C1FD7            LODA,R0 ABUF
0574 259B 9A0D              BCFR,N  BRSTAR
0575 259D 0441        AERR22 LODI,R0 A'A'
0576 259F CC1F27      STERR2 STRA,R0 BUF3+2
0577 25A2 0C1F33            LODA,R0 NRERR
0578 25A5 D800              BIRR,R0 ERPL1
0579 25A7 CC1F33      ERPL1  STRA,R0 NRERR
0580 25AA 1F2B4C      BRSTAR BCTA,UN STAR
0581                        ************************************************************
0582 25AD 0455        UERR22 LODI,R0 A'U'
0583 25AF 1B6E              BCTR,UN STERR2
0584                        ************************************************************
0585 25B1 0C1F3C      ENDPAS LODA,R0 PASS
0586 25B4 443F              ANDI,R0 H'3F'
0587 25B6 E402              COMI,R0 2
0588 25B8 981A              BCFR,Z  EINDE
0589 25BA 071C              LODI,R3 28
0590 25BC 0F4BD6      LOOP74 LODA,R0 MES3,R3-
0591 25BF 3F2E39            BSTA,UN WRCHAR  "TOTAL ASSEMBLY ERRORS = "
0592 25C2 5B78              BRNR,R3 LOOP74
0593 25C4 0500              LODI,R1 0
0594 25C6 0C1F33            LODA,R0 NRERR
0595 25C9 3F314B            BSTA,UN BINBCD
0596 25CC 0703              LODI,R3 3
0597 25CE 3F31A1            BSTA,UN PRBCD
0598 25D1 1F2219      BRPRPS BCTA,UN PRPASS
0599                        ************************************************************
0600 25D4 E403        EINDE  COMI,R0 3
0601 25D6 981C              BCFR,Z  SYMUSE
0602 25D8 3F2FDA            BSTA,UN DMPOBJ
0603 25DB 0C1FD7            LODA,R0 ABUF
0604 25DE 0E1FD8            LODA,R2 ABUF+1
0605 25E1 CC1F34            STRA,R0 STADD
0606 25E4 CE1F35            STRA,R2 STADD+1
0607 25E7 07FF              LODI,R3 H'FF'
0608 25E9 CF1F24            STRA,R3 FLAG3
0609 25EC 3F2FDA            BSTA,UN DMPOBJ
0610 25EF 3F30A3            BSTA,UN HEADER
0611 25F2 1B5D              BCTR,UN BRPRPS
0612                        ************************************************************
0613 25F4 0710        SYMUSE LODI,R3 16
0614 25F6 0F4620      LOOP76 LODA,R0 MES6,R3-
0615 25F9 3F2E39            BSTA,UN WRCHAR  "SYMBOLS USED "
0616 25FC 5B70              BRNR,R3 LOOP76
```

```
LINE ADDR  OBJECT  E SOURCE

0617 25FE 0D1F41          LODA,R1 LANR
0618 2601 0C1F42          LODA,R0 LANR+1
0619 2604 3F314B          BSTA,UN BINBCD
0620 2607 0704            LODI,R3 4
0621 2609 3F31A1          BSTA,UN PRBCD
0622 260C 1043            BCTR,UN BRRRR5
0623                      ********************************************************************
0624 260E 1C2AF0    DATAIN BCTA,Z  AERR1
0625 2611 3F2FC0          BSTA,UN ENDREG
0626 2614 9C2AF0          BCFA,Z  AERR1
0627 2617 CF1FD9          STRA,R3 NEGCON
0628 261A 3F307F          BSTA,UN INCCNT
0629 261D 3F34B4          BSTA,UN STRING
0630 2620 1A17            BCTR,N  LAB1
0631 2622 1D265D          BCTA,P  LAB2
0632 2625 0D1FDB          LODA,R1 STRLEN
0633 2628 6500      LOOP63 IORI,R1 0
0634 262A 182E            BCTR,Z  CONTIN
0635 262C 0D7FE2          LODA,R0 BUF9-1,R1
0636 262F CD7FC6          STRA,R0 BYTE1-1,R1
0637 2632 F974            BDRR,R1 LOOP63
0638 2634 0D1FDB          LODA,R1 STRLEN
0639 2637 1B21            BCTR,UN CONTIN
0640                      ********************************************************************
0641 2639 0F1FD9    LAB1   LODA,R3 NEGCON
0642 263C CF1F75          STRA,R3 CHARNR
0643 263F 3F3345          BSTA,UN CONTST
0644 2642 1E2B15          BCTA,N  UERR1
0645 2645 1D2AF0          BCTA,P  AERR1
0646 2648 0D1FD7          LODA,R1 ABUF
0647 264B 1805            BCTR,Z  LAB3
0648 264D E5FF            COMI,R1 H'FF'
0649 264F 9C2679          BCFA,Z  LAB4
0650 2652 0E1FD8    LAB3   LODA,R2 ABUF+1
0651 2655 CE1FC7          STRA,R2 BYTE1
0652 2658 0501            LODI,R1 1
0653 265A 1F2B49    CONTIN BCTA,UN CONLIN
0654                      ********************************************************************
0655 265D E401      LAB2   COMI,R0 1
0656 265F 1908            BCTR,P  LAB5
0657 2661 0D1FDB          LODA,R1 STRLEN
0658 2664 1C2AF0          BCTA,Z  AERR1
0659 2667 1B18            BCTR,UN AER4
0660                      ********************************************************************
0661 2669 0510      LAB5   LODI,R1 16
0662 266B 044E      NER16  LODI,R0 A'N'
0663 266D CC1F27    STBF3  STRA,R0 BUF3+2
0664 2670 3F3076          BSTA,UN INCERR
0665 2673 CD1FDB          STRA,R1 STRLEN
0666 2676 1F2628          BCTA,UN LOOP63
0667                      ********************************************************************
0668 2679 0501      LAB4   LODI,R1 1
0669 267B 20              EORZ    R0
0670 267C CC1FE3          STRA,R0 BUF9
0671 267F 1B6A            BCTR,UN NER16
0672                      ********************************************************************
```

```
LINE ADDR  OBJECT  E SOURCE

0673 2681 0441        AER4   LODI,R0 A'A'
0674 2683 1B68               BCTR,UN STBF3
0675                  ********************************************************************
0676 2685 1C2AF4      RESINS BCTA,Z  AERR0
0677 2688 3F3345             BSTA,UN CONTST
0678 268B 1E2B11             BCTA,N  UERR0
0679 268E 1D2AF4             BCTA,P  AERR0
0680 2691 0D1FD7             LODA,R1 ABUF
0681 2694 1A2D               BCTR,N  NER0
0682 2696 0F1F3C             LODA,R3 PASS
0683 2699 E703               COMI,R3 3
0684 269B 3C2FDA             BSTA,Z  DMPOBJ
0685 269E 0D1FD7             LODA,R1 ABUF
0686 26A1 0E1FD8             LODA,R2 ABUF+1
0687 26A4 8E1F32             ADDA,R2 COUNT2+1
0688 26A7 7708               PPSL    H'08'
06   26A9 8D1F31             ADDA,R1 COUNT2
0690 26AC 7508               CPSL    H'08'
0691 26AE CD1F31             STRA,R1 COUNT2
0692 26B1 CE1F32             STRA,R2 COUNT2+1
0693 26B4 CD1F34             STRA,R1 STADD
0694 26B7 CE1F35             STRA,R2 STADD+1
0695 26BA 0C1FDE             LODA,R0 INDIR
0696 26BD 9C2B42             BCFA,Z  WERR
0697 26C0 1F2B4C             BCTA,UN STAR
0698                  ********************************************************************
0699 26C3 0500        NER0   LODI,R1 0
0700 26C5 1F266B             BCTA,UN NER16
0701                  ********************************************************************
0702 26C8 E702        EJEINS COMI,R3 2
0703 26CA 9808               BCFR,Z  NXTPAG
0704 26CC 0D1F74      EJECT  LODA,R1 LINPAG
0705 26CF 3F2E06      LOOP64 BSTA,UN LF
0706 26D2 F97B               BDRR,R1 LOOP64
0707 26D4 3F30AA      NXTPAG BSTA,UN NEWPAG
07   26D7 0C1F38      INCLNR LODA,R0 LINENR+1
0709 26DA D808               BIRR,R0 GCARLN
0710 26DC 0D1F37             LODA,R1 LINENR
0711 26DF D900               BIRR,R1 LAB6
0712 26E1 CD1F37      LAB6   STRA,R1 LINENR
0713 26E4 CC1F38      GCARLN STRA,R0 LINENR+1
0714 26E7 1F2300             BCTA,UN BLKBF3
0715                  ********************************************************************
0716 26EA 1C2AEC      MCONIN BCTA,Z  AERR2
0717 26ED 0502               LODI,R1 2
0718 26EF E701               COMI,R3 1
0719 26F1 1C2B49             BCTA,Z  CONLIN
0720 26F4 3F3345             BSTA,UN CONTST
0721 26F7 1E2B19             BCTA,N  UERR2
0722 26FA 1D2AEC             BCTA,P  AERR2
0723 26FD 0D1FD7             LODA,R1 ABUF
0724 2700 1E2AEC             BCTA,N  AERR2
0725 2703 0E1FD8             LODA,R2 ABUF+1
0726 2706 CD1FC7             STRA,R1 BYTE1
0727 2709 CE1FC8             STRA,R2 BYTE2
0728 270C 0502               LODI,R1 2
```

```
LINE ADDR  OBJECT  E SOURCE

0729 270E 1F2B49            BCTA,UN CONLIN
0730                        ************************************************************
0731 2711 1C2AF4      SPCINS BCTA,Z  AERR0
0732 2714 E702              COMI,R3 2
0733 2716 9C2B4C            BCFA,Z  STAR
0734 2719 3F3345            BSTA,UN CONTST
0735 271C 1E2B11            BCTA,N  UERR0
0736 271F 1D2AF4            BCTA,P  AERR0
0737 2722 0D1FD7            LODA,R1 ABUF
0738 2725 9C26C3            BCFA,Z  NER0
0739 2728 0D1FD8            LODA,R1 ABUF+1
0740 272B 180B              BCTR,Z  BRINLN
0741 272D ED1F74            COMA,R1 LINPAG
0742 2730 9E26CF            BCFA,N  LOOP64
0743 2733 3F2E06      LOOP65 BSTA,UN LF
0744 2736 F97B              BDRR,R1 LOOP65
0745 2738 1F26D7      BRINLN BCTA,UN INCLNR
0;                          ************************************************************
0747 273B 1C2AF4      PRTINS BCTA,Z  AERR0
0748 273E E702              COMI,R3 2
0749 2740 9C2B4C            BCFA,Z  STAR
0750 2743 3F2FC0            BSTA,UN ENDREG
0751 2746 0F7F7B            LODA,R0 BUF5,R3
0752 2749 E4CF              COMI,R0 H'CF'    -O-
0753 274B 9C2AF4            BCFA,Z  AERR0
0754 274E 0F3F7B            LODA,R0 BUF5,R3,+
0755 2751 E4CE              COMI,R0 H'CE'    -N-
0756 2753 1810              BCTR,Z  CL8PAS
0757 2755 E4C6              COMI,R0 H'C6'    -F-
0758 2757 9C2AF4            BCFA,Z  AERR0
0759 275A 0C1F3C            LODA,R0 PASS
0760 275D 6480              IORI,R0 H'80'
0761 275F CC1F3C      LOOP66 STRA,R0 PASS
0762 2762 1F2B4C            BCTA,UN STAR
0763                        ************************************************************
0764 2765 0C1F3C      CL8PAS LODA,R0 PASS
0;   2768 447F              ANDI,R0 H'7F'
0766 276A 1B73              BCTR,UN LOOP66
0767                        ************************************************************
0768 276C 1C2AF4      PCHINS BCTA,Z  AERR0
0769 276F E703              COMI,R3 3
0770 2771 9C2B4C            BCFA,Z  STAR
0771 2774 3F2FC0            BSTA,UN ENDREG
0772 2777 0F7F7B            LODA,R0 BUF5,R3
0773 277A E4CF              COMI,R0 H'CF'    -O-
0774 277C 9C2AF4            BCFA,Z  AERR0
0775 277F 0F3F7B            LODA,R0 BUF5,R3,+
0776 2782 E4CE              COMI,R0 H'CE'    -N-
0777 2784 1813              BCTR,Z  CL4PAS
0778 2786 E4C6              COMI,R0 H'C6'    -F-
0779 2788 9C2AF4            BCFA,Z  AERR0
0780 278B 3F2FDA            BSTA,UN DMPOBJ
0781 278E 0C1F3C            LODA,R0 PASS
0782 2791 6440              IORI,R0 H'40'
0783 2793 CC1F3C      LOOP67 STRA,R0 PASS
0784 2796 1F2B4C            BCTA,UN STAR
```

```
LINE ADDR  OBJECT  E SOURCE

0785                    ********************************************************************
0786 2799 0C1F3C        CL4PAS LODA,R0 PASS
0787 279C 44BF                 ANDI,R0 H'BF'
0788 279E 1B73                 BCTR,UN LOOP67
0789                    ********************************************************************
0790 27A0 E702          TITLIN COMI,R3 2
0791 27A2 9C26D7               BCFA,Z  INCLNR
0792 27A5 0628                 LODI,R2 40
0793 27A7 3F2FC0               BSTA,UN ENDREG
0794 27AA 9810                 BCFR,Z  KLTITL
0795 27AC 0F1F75               LODA,R3 CHARNR
0796 27AF 0F3F7A        LOOP68 LODA,R0 BUF5-1,R3,+
0797 27B2 1808                 BCTR,Z  KLTITL
0798 27B4 CE5F45               STRA,R0 BUF1,R2,-
0799 27B7 5A76                 BRNR,R2 LOOP68
0800 27B9 1F26CC        LOOP69 BCTA,UN EJECT
0801                    ********************************************************************
0802 27BC 0420          KLTITL LODI,R0 H' '
0803 27BE CE5F45        LOOP70 STRA,R0 BUF1,R2,-
0804 27C1 5A7B                 BRNR,R2 LOOP70
0805 27C3 1F27B9               BCTA,UN LOOP69
0806                    ********************************************************************
0807 27C6 0500          LIBRIN LODI,R1 0
0808 27C8 CD1FC6               STRA,R1 BYTCOD
0809 27CB 3F2FDA               BSTA,UN DMPOBJ
0810 27CE 0C1F3C               LODA,R0 PASS
0811 27D1 443F                 ANDI,R0 H'3F'
0812 27D3 CC1F3C               STRA,R0 PASS
0813 27D6 E402                 COMI,R0 2
0814 27D8 9808                 BCFR,Z  BRCRLF
0815 27DA 3F3088               BSTA,UN INCLIN
0816 27DD 3F3208               BSTA,UN PRLIN
0817 27E0 1B13                 BCTR,UN NXTCAR
0818                    ********************************************************************
0819 27E2 3F2E00        BRCRLF BSTA,UN CRLF
0820 27E5 0F1F75               LODA,R3 CHARNR
0821 27E8 EF1FC3        LOOP71 COMA,R3 CHACNT
0822 27EB 1908                 BCTR,F  NXTCAR
0823 27ED 0F3F7A               LODA,R0 BUF5-1,R3,+
0824 27F0 3F2E39               BSTA,UN WRCHAR
0825 27F3 1B73                 BCTR,UN LOOP71
0826 27F5 3F2E0F        NXTCAR BSTA,UN LEESCH
0827 27F8 1F230D               BCTA,UN BLKBF3
0828                    ********************************************************************
0829 27FB 3D2B05        DIV1BT BSTA,P  RERR
0830 27FE E701                 COMI,R3 1
0831 2800 1806                 BCTR,Z  CONLN1
0832 2802 0C1F73               LODA,R0 OPC1
0833 2805 CC1FC7               STRA,R0 BYTE1
0834 2808 0501          CONLN1 LODI,R1 1
0835 280A 1F2B49               BCTA,UN CONLIN
0836                    ********************************************************************
0837 280D BD2B05        BT1REG BSFA,P  RERR
0838 2810 E701                 COMI,R3 1
0839 2812 182B                 BCTR,Z  WERR11
0840 2814 3F307F               BSTA,UN INCCNT
```

```
LINE ADDR  OBJECT  E SOURCE

0841 2817 3F3345      LOOP72 BSTA,UN CONTST
0842 281A 0E1F73             LODA,R2 OPC1
0843 281D 6400               IORI,R0 0
0844 281F 9829               BCFR,Z  RER04
0845 2821 0D1FD7             LODA,R1 ABUF
0846 2824 9824               BCFR,Z  RER04
0847 2826 0C1FD8             LODA,R0 ABUF+1
0848 2829 E403               COMI,R0 3
0849 282B 1D284A             BCTA,P  RER04
0850 282E 82                 ADDZ    R2
0851 282F 9802        TESTBT BCFR,Z  STBYT1
0852 2831 0460               LODI,R0 H'60'
0853 2833 0C1FC7      STBYT1 STRA,R0 BYTE1
0854 2836 E440               COMI,R0 H'40'
0855 2838 1C2B21      BRSER  BCTA,Z  SERR1
0856 283B E4C0               COMI,R0 H'C0'    NOP?
0857 283D 1879               BCTR,Z  BRSER
0858 283F 0501        WERR11 LODI,R1 1
0859 2841 0C1FDE             LODA,R0 INDIR
0860 2844 9C2B3F             BCFA,Z  WERR1
0861 2847 1F2B49             BCTA,UN CONLIN
0862                  ********************************************************************
0863 284A 3F2B05      RER04  BSTA,UN RERR
0864 284D 02                 LODZ    R2
0865 284E 185F               BCTR,UN TESTBT
0866                  ********************************************************************
0867 2850 BD2B05      IMMED  BSFA,P  RERR
0868 2853 E701               COMI,R3 1
0869 2855 1C28BD             BCTA,Z  CONTL2
0870 2858 3F307F             BSTA,UN INCCNT
0871 285B 3F3345             BSTA,UN CONTST
0872 285E 0E1F73             LODA,R2 OPC1
0873 2861 6400               IORI,R0 0
0874 2863 9C28C4             BCFA,Z  RERR6
0875 2866 0D1FD7             LODA,R1 ABUF
0876 2869 9C28C4             BCFA,Z  RERR6
0877 286C 0C1FD8             LODA,R0 ABUF+1
0878 286F E403               COMI,R0 3
0879 2871 1D28C4             BCTA,P  RERR6
0880 2874 82                 ADDZ    R2
0881 2875 CC1FC7             STRA,R0 BYTE1
0882 2878 E49B               COMI,R0 H'9B'
0883 287A 1C28DD             BCTA,Z  BRREL
0884 287D E4BB               COMI,R0 H'BB'
0885 287F 9805               BCFR,Z  BRSUBR
0886 2881 043B               LODI,R0 H'3B'
0887 2883 1F28DF             BCTA,UN SERBR
0888                  ********************************************************************
0889 2886 3F3345      BRSUBR BSTA,UN CONTST
0890 2889 19B7               BCTR,P  *ADAER2
0891 288B 1E2B19             BCTA,N  UERR2
0892 288E 0C1F72             LODA,R0 ADRTYP
0893 2891 E405               COMI,R0 5
0894 2893 1C28E4             BCTA,Z  CALBT2
0895 2896 E40A               COMI,R0 H'0A'
0896 2898 1C2A3E             BCTA,Z  LAB7
```

```
LINE ADDR  OBJECT  E SOURCE

0897 289B 0D1FD7           LODA,R1 ABUF
0898 289E 1804             BCTR,Z  LODBF2
0899 28A0 E5FF             COMI,R1 H'FF'
0900 28A2 989E             BCFR,Z  *ADAER2
0901 28A4 0E1FD8     LODBF2 LODA,R2 ABUF+1
0902 28A7 CE1FC8           STRA,R2 BYTE2
0903 28AA 0C1FDE           LODA,R0 INDIR
0904 28AD 9C2B3D           BCFA,Z  WERR2
0905 28B0 0F1F75     LOOP73 LODA,R3 CHARNR
0906 28B3 0F3F7A           LODA,R0 BUF5-1,R3,+
0907 28B6 1805             BCTR,Z  CONTL2
0908 28B8 E420             COMI,R0 A' '
0909 28BA 9C2B25           BCFA,Z  SERR2
0910 28BD 0502       CONTL2 LODI,R1 2
0911 28BF 1F2B49           BCTA,UN CONLIN
0912                 ********************************************************************
0913 28C2 2AEC       ADAER2 ACON    AERR2
0914                 ********************************************************************
0915 28C4 CE1FC7     RERR6  STRA,R2 BYTE1
0916 28C7 0452             LODI,R0 A'R'
0917 28C9 CC1F26           STRA,R0 BUF3+1
0918 28CC 3F3076           BSTA,UN INCERR
0919 28CF 1F2886           BCTA,UN BRSUBR
0920                 ********************************************************************
0921 28D2 0453       SER5   LODI,R0 A'S'
0922 28D4 CC1F28           STRA,R0 BUF3+3
0923 28D7 3F3076           BSTA,UN INCERR
0924 28DA 1F2886           BCTA,UN BRSUBR
0925                 ********************************************************************
0926 28DD 041B       BRREL  LODI,R0 H'1B'
0927 28DF CC1FC7     SERBR  STRA,R0 BYTE1
0928 28E2 1B6E             BCTR,UN SER5
0929                 ********************************************************************
0930 28E4 3F36F7     CALBT2 BSTA,UN CALADR
0931 28E7 98D9             BCFR,Z  *ADAER2
0932 28E9 CE1FC8           STRA,R2 BYTE2
0933 28EC 1F2B60           BCTA,UN LOOP73
0934                 ********************************************************************
0935 28EF 8D2B05     ABSOL  BSFA,P  RERR
0936 28F2 E701             COMI,R3 1
0937 28F4 1C29C9           BCTA,Z  NOG3BT
0938 28F7 3F307F           BSTA,UN INCCNT
0939 28FA 3F3345           BSTA,UN CONTST
0940 28FD 0E1F73           LODA,R2 OPC1
0941 2900 6400             IORI,R0 0
0942 2902 9C29D8           BCFA,Z  RERR4
0943 2905 0D1FD7           LODA,R1 ABUF
0944 2908 9C29D8           BCFA,Z  RERR4
0945 290B 0C1FD8           LODA,R0 ABUF+1
0946 290E E403             COMI,R0 3
0947 2910 1D29D8           BCTA,P  RERR4
0948 2913 82               ADDZ    R2
0949 2914 CC1FC7           STRA,R0 BYTE1
0950 2917 E49F             COMI,R0 H'9F'
0951 2919 1C29F1           BCTA,Z  SERR8
0952 291C E4BF             COMI,R0 H'BF'
```

```
LINE ADDR  OBJECT  E SOURCE

0953 291E 9805              BCFR,Z  CALB23
0954 2920 043F              LODI,R0 H'3F'
0955 2922 1F29F3            BCTA,UN SERR6
0956                        ********************************************************************
0957 2925 3F3345      CALB23 BSTA,UN CONTST
0958 2928 1D2AE8            BCTA,F  AERR3
0959 292B 1E2B1D            BCTA,N  UERR3
0960 292E 0D1FD7            LODA,R1 ABUF
0961 2931 1E2AE8            BCTA,N  AERR3
0962 2934 0C1F72            LODA,R0 ADRTYP
0963 2937 E407              COMI,R0 7
0964 2939 1C29F8            BCTA,Z  SETIND
0965 293C 0460              LODI,R0 H'60'
0966 293E 4C1F31            ANDA,R0 COUNT2
0967 2941 4560              ANDI,R1 H'60'
0968 2943 E1                COMZ    R1
0969 2944 9C2B33            BCFA,Z  PERR3
0970 2947 0D1FD7            LODA,R1 ABUF
0971 294A 459F              ANDI,R1 H'9F'
0972 294C 0E1FD8            LODA,R2 ABUF+1
0973 294F 0C1FDE            LODA,R0 INDIR
0974 2952 1902              BCTR,Z  BT2STR
0975 2954 6580              IORI,R1 H'80'
0976 2956 CD1FC8      BT2STR STRA,R1 BYTE2
0977 2959 CE1FC9            STRA,R2 BYTE3
0978 295C 0F1F75            LODA,R3 CHARNR
0979 295F 0F3F7A            LODA,R0 BUF5-1,R3,+
0980 2962 1C29BF            BCTA,Z  LODNX3
0981 2965 CF1F75            STRA,R3 CHARNR
0982 2968 E420              COMI,R0 A' '
0983 296A 1C29BF            BCTA,Z  LODNX3
0984 296D E42C              COMI,R0 A','
0985 296F 9C29CE            BCFA,Z  IERR
0986 2972 3F3345            BSTA,UN CONTST
0987 2975 9C29CE            BCFA,Z  IERR
0988 2978 0D1FD7            LODA,R1 ABUF
0989 297B 9C29CE            BCFA,Z  IERR
0990 297E 0C1FD8            LODA,R0 ABUF+1
0991 2981 E403              COMI,R0 3
0992 2983 1D29CE            BCTA,F  IERR
0993 2986 0E1FC7            LODA,R2 BYTE1
0994 2989 4603              ANDI,R2 H'03'
0995 298B 9C2B29            BCFA,Z  SERR3
0996 298E 6C1FC7            IORA,R0 BYTE1
0997 2991 CC1FC7            STRA,R0 BYTE1
0998 2994 0F1F75            LODA,R3 CHARNR
0999 2997 0D1FC8            LODA,R1 BYTE2
1000 299A 0F3F7A            LODA,R0 BUF5-1,R3,+
1001 299D 181B              BCTR,Z  SET60
1002 299F E420              COMI,R0 A' '
1003 29A1 1817              BCTR,Z  SET60
1004 29A3 E42C              COMI,R0 A','
1005 29A5 9827              BCFR,Z  IERR
1006 29A7 0F3F2A            LODA,R0 BUF5-1,R3,+
1007 29AA E42B              COMI,R0 A'+'
1008 29AC 9804              BCFR,Z  COMMIN
```

```
LINE ADDR  OBJECT  E SOURCE

1009 29AE 6520       SET20  IORI,R1 H'20'
1010 29B0 1B0A              BCTR,UN STRB2
1011 29B2 E42D       COMMIN COMI,R0 A'-'
1012 29B4 9818              BCFR,Z  IERR
1013 29B6 6540       SET40  IORI,R1 H'40'
1014 29B8 1B02              BCTR,UN STRB2
1015 29BA 6560       SET60  IORI,R1 H'60'
1016 29BC CD1FC8     STRB2  STRA,R1 BYTE2
1017 29BF 0F3F7A     LODNX3 LODA,R0 BUF5-1,R3,+
1018 29C2 1805              BCTR,Z  NOG3BT
1019 29C4 E420              COMI,R0 A' '
1020 29C6 9C2B29            BCFA,Z  SERR3
1021 29C9 0503       NOG3BT LODI,R1 3
1022 29CB 1F2B49            BCTA,UN CONLIN
1023                 ********************************************************************
1024 29CE 0449       IERR   LODI,R0 A'I'
1025 29D0 CC1F27            STRA,R0 BUF3+2
1026 29D3 3F3076            BSTA,UN INCERR
1027 29D6 1B67              BCTR,UN LODNX3
1028                 ********************************************************************
1029 29D8 CE1FC7     RERR4  STRA,R2 BYTE1
1030 29DB 0452              LODI,R0 A'R'
1031 29DD CC1F26            STRA,R0 BUF3+1
1032 29E0 3F3076            BSTA,UN INCERR
1033 29E3 1F2925            BCTA,UN CALB23
1034                 ********************************************************************
1035 29E6 0453       SERR7  LODI,R0 A'S'
1036 29E8 CC1F28            STRA,R0 BUF3+3
1037 29EB 3F3076            BSTA,UN INCERR
1038 29EE 1F2925            BCTA,UN CALB23
1039                 ********************************************************************
1040 29F1 041F       SERR8  LODI,R0 H'1F'
1041 29F3 CC1FC7     SERR6  STRA,R0 BYTE1
1042 29F6 1B6E              BCTR,UN SERR7
1043                 ********************************************************************
1044 29F8 0C1FDE     SETIND LODA,R0 INDIR
1045 29FB 1802              BCTR,Z  STBYT2
1046 29FD 6580              IORI,R1 H'80'
1047 29FF CD1FC8     STBYT2 STRA,R1 BYTE2
1048 2A02 CE1FC9            STRA,R2 BYTE3
1049 2A05 1F29BF            BCTA,UN LODNX3
1050                 ********************************************************************
1051 2A08 BC2B05     ZERINS BSFA,Z  RERR
1052 2A0B E701              COMI,R3 1
1053 2A0D 1C2808            BCTA,Z  CONLN1
1054 2A10 0E1F73            LODA,R2 OPC1
1055 2A13 3F2FC0            BSTA,UN ENDREG
1056 2A16 9C284A            BCFA,Z  RER04
1057 2A19 1F2817            BCTA,UN LOOP72
1058                 ********************************************************************
1059 2A1C BC2B05     PSW2BT BSFA,Z  RERR
1060 2A1F E701              COMI,R3 1
1061 2A21 1D28BD            BCTA,P  CONTL2
1062 2A24 0E1F73            LODA,R2 OPC1
1063 2A27 CE1FC7            STRA,R2 BYTE1
1064 2A2A 1F2886            BCTA,UN BRSUBR
```

```
LINE ADDR  OBJECT  E SOURCE

1065                ********************************************************************
1066 2A2D BC2B05    ZERRSR BSFA,Z  RERR
1067 2A30 E701             COMI,R3 1
1068 2A32 1C28BD           BCTA,Z  CONTL2
1069 2A35 0C1F73           LODA,R0 OPC1
1070 2A38 CC1FC7           STRA,R0 BYTE1
1071 2A3B 3F2886           BSTA,UN BRSUBR
1072 2A3E 0E1FD8    LAB7   LODA,R2 ABUF+1
1073 2A41 0D1FD7           LODA,R1 ABUF
1074 2A44 3F3711           BSTA,UN RELMAX
1075 2A47 9C2AEC           BCFA,Z  AERR2
1076 2A4A CE1FC8           STRA,R2 BYTE2
1077 2A4D 1F28B0           BCTA,UN LOOP73
1078                ********************************************************************
1079 2A50 BC2B05    BXASXA BSFA,Z  RERR
1080 2A53 E701             COMI,R3 1
1081 2A55 1C29C9           BCTA,Z  NOG3BT
1082 2A58 0C1F73           LODA,R0 OPC1
1083 2A5B CC1FC7           STRA,R0 BYTE1
1084 2A5E 0C1F6F           LODA,R0 CRTL1
1085 2A61 1803             BCTR,Z  LAB8
1086 2A63 3F307F           BSTA,UN INCCNT
1087 2A66 3F3345    LAB8   BSTA,UN CONTST
1088 2A69 1D2AE8           BCTA,P  AERR3
1089 2A6C 1E2B1D           BCTA,N  UERR3
1090 2A6F 0D1FD7           LODA,R1 ABUF
1091 2A72 1E2AE8           BCTA,N  AERR3
1092 2A75 0E1FD8           LODA,R2 ABUF+1
1093 2A78 0C1FDE           LODA,R0 INDIR
1094 2A7B 1802             BCTR,Z  STBYT
1095 2A7D 6580             IORI,R1 H'80'
1096 2A7F CD1FC8    STBYT  STRA,R1 BYTE2
1097 2A82 CE1FC9           STRA,R2 BYTE3
1098 2A85 0C1F72           LODA,R0 ADRTYP
1099 2A88 E40C             COMI,R0 H'0C'
1100 2A8A 1828             BCTR,Z  BRLNXT
1101 2A8C 0F1F75           LODA,R3 CHARNR
1102 2A8F 0F3F7A           LODA,R0 BUF5-1,R3,+
1103 2A92 1820             BCTR,Z  BRLNXT
1104 2A94 CF1F75           STRA,R3 CHARNR
1105 2A97 E420             COMI,R0 A' '
1106 2A99 1819             BCTR,Z  BRLNXT
1107 2A9B E42C             COMI,R0 A','
1108 2A9D 9C29CE           BCFA,Z  IERR
1109 2AA0 3F3345           BSTA,UN CONTST
1110 2AA3 9C29CE           BCFA,Z  IERR
1111 2AA6 0D1FD7           LODA,R1 ABUF
1112 2AA9 9C29CE           BCFA,Z  IERR
1113 2AAC 0E1FD8           LODA,R2 ABUF+1
1114 2AAF E603             COMI,R2 3
1115 2AB1 9C29CE           BCFA,Z  IERR
1116 2AB4 1F29BF    BRLNXT BCTA,UN LODNX3
1117 2AB7 044C      LABERR LODI,R0 A'L'
1118 2AB9 CC1F25           STRA,R0 BUF3
1119 2ABC 20        PT7W0  EORZ    R0
1120 2ABD CC1F72           STRA,R0 ADRTYP
```

```
LINE ADDR  OBJECT  E SOURCE

1121 2AC0 04C0            LODI,R0 H'C0'    NOP
1122 2AC2 0703            LODI,R3 3
1123 2AC4 CF5FC7    LOOP80 STRA,R0 BYTE1,R3,-      NOP IN OBJECT BUFFER
1124 2AC7 5B7B            BRNR,R3 LOOP80
1125 2AC9 0503            LODI,R1 3        3 BYTE CODE
1126 2ACB 3F3076    ERRPL1 BSTA,UN INCERR
1127 2ACE 1F2B49          BCTA,UN CONLIN
1128                      ************************************************************
1129 2AD1 044C      LERR0 LODI,R0 A'L'
1130 2AD3 CC1F25          STRA,R0 BUF3
1131 2AD6 0500            LODI,R1 0        0 BYTE CODE
1132 2AD8 1B71            BCTR,UN ERRPL1
1133                      ************************************************************
1134 2ADA 0446      FFERR LODI,R0 A'F'
1135 2ADC CC1F25          STRA,R0 BUF3
1136 2ADF 1B29            BCTR,UN BRERR
1.                        ************************************************************
1138 2AE1 044F      OPCERR LODI,R0 A'O'
1139 2AE3 CC1F26          STRA,R0 BUF3+1
1140 2AE6 1B54            BCTR,UN PT7W0
1141                      ************************************************************
1142 2AE8 0503      AERR3 LODI,R1 3
1143 2AEA 1B0A            BCTR,UN AERR
1144                      ************************************************************
1145 2AEC 0502      AERR2 LODI,R1 2
1146 2AEE 1906            BCTR,P  AERR
1147                      ************************************************************
1148 2AF0 0501      AERR1 LODI,R1 1
1149 2AF2 1B02            BCTR,UN AERR
1150                      ************************************************************
1151 2AF4 0500      AERR0 LODI,R1 0
1152 2AF6 0441      AERR  LODI,R0 A'A'
1153 2AF8 CC1F27    STERR STRA,R0 BUF3+2
1154 2AFB 0400            LODI,R0 0
1155 2AFD CC1FC8          STRA,R0 BYTE2
1.   2B00 CC1FC9          STRA,R0 BYTE3
1157 2B03 1B46            BCTR,UN ERRPL1
1158                      ************************************************************
1159 2B05 0452      RERR  LODI,R0 A'R'
1160 2B07 CC1F26          STRA,R0 BUF3+1
1161 2B0A 1F3076    BRERR BCTA,UN INCERR
1162                      ************************************************************
1163 2B0D 0455      UERR  LODI,R0 A'U'
1164 2B0F 1B67            BCTR,UN STERR
1165                      ************************************************************
1166 2B11 0500      UERR0 LODI,R1 0
1167 2B13 1B78            BCTR,UN UERR
1168                      ************************************************************
1169 2B15 0501      UERR1 LODI,R1 1
1170 2B17 1B74            BCTR,UN UERR
1171                      ************************************************************
1172 2B19 0502      UERR2 LODI,R1 2
1173 2B1B 1B70            BCTR,UN UERR
1174                      ************************************************************
1175 2B1D 0503      UERR3 LODI,R1 3
1176 2B1F 1B6C            BCTR,UN UERR
```

```
LINE ADDR  OBJECT  E SOURCE

1177                ************************************************************
1178 2B21 0501     SERR1  LODI,R1 1
1179 2B23 1B06             BCTR,UN SERR
1180                ************************************************************
1181 2B25 0502     SERR2  LODI,R1 2
1182 2B27 1B02             BCTR,UN SERR
1183                ************************************************************
1184 2B29 0503     SERR3  LODI,R1 3
1185 2B2B 0453     SERR   LODI,R0 A'S'
1186 2B2D CC1F28           STRA,R0 BUF3+3
1187 2B30 1F2ACB           BCTA,UN ERRPL1
1188                ************************************************************
1189 2B33 0503     PERR3  LODI,R1 3
1190 2B35 0450             LODI,R0 A'P'
1191 2B37 CC1F27           STRA,R0 BUF3+2
1192 2B3A 1F2ACB           BCTA,UN ERRPL1
1193                ************************************************************
1194 2B3D 0502     WERR2  LODI,R1 2
1195 2B3F CD1FC6   WERR1  STRA,R1 BYTCOD
1196 2B42 0457     WERR   LODI,R0 A'W'
1197 2B44 CC1F27           STRA,R0 BUF3+2
1198 2B47 1B03             BCTR,UN STAR
1199                ************************************************************
1200 2B49 CD1FC6   CONLIN STRA,R1 BYTCOD
1201 2B4C 3F3088   STAR   BSTA,UN INCLIN
1202 2B4F 9807             BCFR,Z  GEENCR
1203 2B51 E401             COMI,R0 1       WAAROM???
1204 2B53 9803             BCFR,Z  GEENCR
1205 2B55 3F30AA           BSTA,UN NEWPAG
1206 2B58 3F3208   GEENCR  BSTA,UN PRLIN
1207 2B5B 0E1F32           LODA,R2 COUNT2+1
1208 2B5E 8E1FC6           ADDA,R2 BYTCOD
1209 2B61 CE1F32           STRA,R2 COUNT2+1
1210 2B64 0D1F31           LODA,R1 COUNT2
1211 2B67 7708             PPSL    H'08'
1212 2B69 8500             ADDI,R1 0
1213 2B6B CD1F31           STRA,R1 COUNT2
1214 2B6E 7508             CPSL    H'08'
1215 2B70 CD1F39           STRA,R1 ADDRES
1216 2B73 CE1F3A           STRA,R2 ADDRES+1
1217 2B76 0C1F3C           LODA,R0 PASS
1218 2B79 447E             ANDI,R0 H'7E'
1219 2B7B E403             COMI,R0 3       PASS3?
1220 2B7D 981B             BCFR,Z  RET
1221 2B7F 0C1FC6           LODA,R0 BYTCOD
1222 2B82 1816             BCTR,Z  RET     IS DIT WEL NODIG???
1223 2B84 C3               STRZ    R3
1224 2B85 8C1F24           ADDA,R0 FLAG3   AANTAL BYTES PER REGEL OPTELLEN
1225 2B88 CC1F24           STRA,R0 FLAG3
1226 2B8B C2               STRZ    R2
1227 2B8C C1               STRZ    R1
1228 2B8D 0F5FC7   LOOP81  LODA,R0 BYTE1,R3,-
1229 2B90 CE5F45           STRA,R0 BUF1,R2,-
1230 2B93 5B78             BRNR,R3 LOOP81
1231 2B95 E50F             COMI,R1 H'0F'
1232 2B97 3D2EDA           BSTA,P  DMPOBJ  DUMP 1 REGEL ALS MEER DAN 16 BYTES
```

```
LINE ADDR  OBJECT  E SOURCE

1233 2B9A 0C1F3B      RET     LODA,R0 ENDFLG
1234 2B9D 9C25B1              BCFA,Z  ENDPAS
1235 2BA0 1F230D              BCTA,UN BLKBF3
1236                  ********************************************************************
1237 2BA3 30353632    MES1    DATA    A'0562 ROF RELBMESSA TNEDISER SUEHTEMORP'
     2BA7 20524F46
     2BAB 2052454C
     2BAF 424D4553
     2BB3 53412054
     2BB7 4E454449
     2BBB 53455220
     2BBF 53554548
     2BC3 54454D4F
     2BC7 5250
1238 2BC9 0A0D                DATA    H'0A,0D'          LF,CR
1239 2BCB 203D2053    MES2    DATA    A' = SSAP'
     2BCF 534150
1240 2BD2 0A0A0A0D            DATA    H'0A,0A,0A,0D'
1241 2BD6 203D2053    MES3    DATA    A' = SRORRE RELBMESSA LATOT'
     2BDA 524F5252
     2BDE 45205245
     2BE2 4C424D45
     2BE6 53534120
     2BEA 4C41544F
     2BEE 54
1242 2BEF 0A0A0D              DATA    H'0A,0A,0D'
1243 2BF2 204E4F49    MES4    DATA    A' NOITACIFITNEDI'
     2BF6 54414349
     2BFA 4649544E
     2BFE 454449
1244 2C01 0A0D                DATA    H'0A,0D'
1245 2C03 20454E49    MES5    DATA    A' ENIL TA LLUF ELBAT LOBMYS'
     2C07 4C205441
     2C0B 204C4C55
     2C0F 4620454C
     2C13 42415420
     2C17 4C4F424D
     2C1B 5953
1246 2C1D 0A0A0D              DATA    H'0A,0A,0D'
1247 2C20 20444553    MES6    DATA    A' DESU SLOBMYS'
     2C24 5520534C
     2C28 4F424D59
     2C2C 53
1248 2C2D 0A0A0D              DATA    H'0A,0A,0D'
1249 2C30 52455443    MES7    DATA    A'RETCARAHC A EPYT DNA HCNUP NO NRUT'
     2C34 41524148
     2C38 43204120
     2C3C 45505954
     2C40 20444E41
     2C44 2048434E
     2C48 5550204E
     2C4C 4F204E52
     2C50 5554
1250 2C52 0A0D                DATA    H'0A,0D'
1251                  ********************************************************************
1252 2C54 09090909    ROMDA1  DATA    H'09,09,09,09,0B,0B,0B,0B,10,10,10,10,11,11
```

```
LINE ADDR  OBJECT  E SOURCE

     2C58 0B0B0B0B
     2C5C 10101010
     2C60 11111212
1253 2C64 14141414          DATA    H'14,14,14,14,14,14,14,14,14,16,1B,1B,1B,1B
     2C68 14141414
     2C6C 14161B1B
     2C70 1B1B1C1C
1254 2C74 202B2B2B          DATA    H'20,2B,2B,2B,2B,40,4B,4B,4B,4B,61,63,63,63
     2C78 2B404B4B
     2C7C 4B4B6163
     2C80 63636364
1255 2C84 64738484          DATA    H'64,73,84,84,91,91,91,91,91,94,94,9C,9C,9D
     2C88 91919191
     2C8C 91949494
     2C90 9C9D9D9D
1256 2C94 9D9D9D9D          DATA    H'9D,9D,9D,9D,9D,A3,A4,A4,BC,BC,BC,D0,D0'
     2C98 9DA3A4A4
     2C9C BCBCBCD0
     2CA0 D0
1257 2CA1 7C2C2B20          DATA    H'7C,2C,2B,20,91,2A,08,9C,84,80,A2,62'
     2CA5 912A089C
     2CA9 8480A262
1258 2CAD 08080909    ROMDA2 DATA    H'08,08,09,09,88,88,89,89,CC,CD,E8,E9,24,25
     2CB1 88888989
     2CB5 CCCDE8E9
     2CB9 24256465
1259 2CBD 9C9DCCCD          DATA    H'9C,9D,CC,CD,DC,DD,E8,E9,F0,02,DA,DA,DB,DB
     2CC1 DCDDE8E9
     2CC5 F002DADA
     2CC9 DBDB2627
1260 2CCD 64E4E4E5          DATA    H'64,E4,E4,E5,E5,59,E4,E4,E5,E5,20,C8,C8,C9
     2CD1 E559E4E4
     2CD5 E5E520C8
     2CD9 C8C9C926
1261 2CDD 27E02627          DATA    H'27,E0,26,27,48,48,48,68,68,98,A4,26,27,20
     2CE1 48484868
     2CE5 6898A426
     2CE9 27202425
1262 2CED 25444445          DATA    H'25,44,44,45,45,52,26,27,A8,A8,A8,A7,A5'
     2CF1 45522627
     2CF5 A8A8A8A7
     2CF9 A5
1263 2CFA 8E6A8868          DATA    H'8E,6A,88,68,66,8A,DE,06,A8,D0,68,45'
     2CFE 668ADE06
     2D02 A8D06845
1264 2D06 169425A8    ROMDA3 DATA    H'16,94,25,A8,16,94,25,A8,17,25,17,25,17,25
     2D0A 169425A8
     2D0E 17251725
     2D12 17251725
1265 2D16 17251725          DATA    H'17,25,17,25,17,25,17,25,1B,0B,16,94,25,A8
     2D1A 17251725
     2D1E 1B0B1694
     2D22 25A8C959
1266 2D26 03169425          DATA    H'03,16,94,25,A8,42,16,94,25,A8,CB,16,94,25
     2D2A A8421694
     2D2E 25A8CB16
```

```
LINE ADDR  OBJECT  E SOURCE

     2D32 9425A8C2
1267 2D36 5202C959          DATA    H'52,02,C9,59,54,43,33,33,53,03,03,C2,52,CB
     2D3A 54433333
     2D3E 530303C2
     2D42 52CB1625
1268 2D46 A8169425          DATA    H'A8,16,94,25,A8,04,C9,59,33,43,54,2A,2A'
     2D4A A804C959
     2D4E 3343542A
     2D52 2A
1269 2D53 010101I1          DATA    H'01,01,01,11,01,01,E1,01,01,01,C1,21'
     2D57 0101E101
     2D5B 0101C121
1270 2D5F 8C848880   ROMDA4 DATA    H'8C,84,88,80,4C,44,48,40,9C,98,1C,18,FC,F8
     2D63 4C444840
     2D67 9C981C18
     2D6B FCF8DCD8
1271 2D6F 5C58BCB8          DATA    H'5C,58,BC,B8,7C,78,3C,38,BF,9F,EC,E4,E8,E0
     2D73 7C783C38
     2D77 BF9FECE4
     2D7B E8E07574
1272 2D7F 942C2428          DATA    H'94,2C,24,28,20,40,6C,64,68,60,10,0C,04,08
     2D83 20406C64
     2D87 6860100C
     2D8B 04080093
1273 2D8F 92C07776          DATA    H'92,C0,77,76,54,70,30,14,34,D0,50,13,12,11
     2D93 54703014
     2D97 34D05013
     2D9B 1211CCC8
1274 2D9F C0ACA4A8          DATA    H'C0,AC,A4,A8,A0,F4,B5,B4,B0,F0,D4,BB,9B'
     2DA3 A0F4B5B4
     2DA7 B0F0D4BB
     2DAB 9B
1275 2DAC 00010203          DATA    H'00,01,02,03,04,05,06,07,08,09,0A,0B'
     2DB0 04050607
     2DB4 08090A0B
1276                        ********************************************************
1277 0000                   END     0

 TOTAL ASSEMBLY ERRORS = 0000
```

```
LINE ADDR  OBJECT  E SOURCE

0001                                  *  TWEEDE HELFT
0002                                  *  PROMETHEUS
0003                                  *  RESIDENT
0004                                  *  ASSEMBLER
0005                  *
0006                  * 3800-3F21 LABEL BUFFER
0007                  * 3F22
0008                  * 3F23       PRINT FLAG
0009                  * 3F24       FLAG3
0010                  * 3F25-3F28 BUF3 (4) ERROR BUFFER
0011                  * 3F29       CRTL
0012                  * 3F2A-3F2D BUF8 (4) NIET COMPRESSED LABEL
0013                  * 3F2E-3F30 BUF6 (3) COMPRESSED LABEL
0014                  * 3F31       COUNT2
0015                  * 3F32       COUNT2+1
0016                  * 3F33       NRERR  AANTAL ASSEMBLY ERRORS (BIN)
0017                  * 3F34       START ADRES OBJECT CODE
0018                  * 3F35       STADD+1
0019                  * 3F36       PAGE COUNT
0020                  * 3F37       LINENR
0021                  * 3F38       LINENR+1
0022                  * 3F39       ADDRES
0023                  * 3F3A       ADDRES+1
0024                  * 3F3B       ENDFLG
0025                  * 3F3C       PASS
0026                  * 3F3D       MAXLAB  MAX AANTAL LABELS
0027                  * 3F3E       MAXLAB+1
0028                  * 3F3F       LSTLAB LAST LABEL ADRES
0029                  * 3F40       LSTLAB+1
0030                  * 3F41       LANR
0031                  * 3F42       LANR+1
0032                  * 3F43       POINT4
0033                  * 3F44       POINT4+1
0034                  * 3F45-3F6C BUF1 (40)  TITLE BUFFER
0035                  * 3F6D       TEL1
0036                  * 3F6E       TEL1+1
0037                  * 3F6F       CRTL1
0038                  * 3F70       POINT5
0039                  * 3F71       POINT5+1
0040                  * 3F72       ADRTYP
0041                  * 3F73       OPC1
0042                  * 3F74       LINPAG  NR OF LINES PER PAG (COUNTING DOWN)
0043                  * 3F75       CHARNR
0044                  * 3F76       REG0A
0045                  * 3F77       REG3A
0046                  * 3F78       REG2A
0047                  * 3F79       REG1A
0048                  * 3F7A       REG0BJ  AANTAL OBJ BYTES OF EEN REGEL
0049                  * 3F7B-3FC2 BUF5 (72) SOURCE CODE BUFFER
0050                  * 3FC3       CHACNT  AANTAL CHAR IN BUF5
0051                  * 3FC4       LABADR
0052                  * 3FC5       LABADR+1
0053                  * 3FC6       BYTCOD  AANTAL BYTES IN CODE
0054                  * 3FC7       BYTE 1
0055                  * 3FC8       BYTE 2
0056                  * 3FC9       BYTE 3
```

```
LINE ADDR  OBJECT  E SOURCE

0057                    * 3FCA-3FD6 BUF4 (13)  OBJECT CODE BUFFER
0058                    * 3FD7      ABUF    RELATIEF ADRES?
0059                    * 3FD8      ABUF+1
0060                    * 3FD9      NEGCON  =FF ALS - VOORKOMT
0061                    * 3FDA      TEKEN
0062                    * 3FDB      STRLEN  LENGTE STRING
0063                    * 3FDC      SRCPNT  SOURCE POINTER
0064                    * 3FDD      CONTRL
0065                    * 3FDE      INDIR    =01 ALS * VOORKOMT
0066                    * 3FDF      HAAK     =FF BIJ > , =00 BIJ < , ANDERS =01
0067                    * 3FE0      STRCON   STRING CONTROL 0=BIN,1=HEX,2=OCT,3=DE
0068                    * 3FE1      DECMSB MSB DECIMAAL BYTE
0069                    * 3FE2      DECLSB
0070                    * 3FE3-3FF4 BUF9
0071                    * 3FF5-3FF8 BCDBUF
0072                    * 3FF9
0073                    * 3FFA      REG2
0074                    * 3FFB      REG3
0075                    * 3FFC      DATA
0076                    *  3FFD      NRBYTS
0077                    * 3FFE      CHECK
0078                    * 3FFF      CHSTOR
0079                    ************************************************************
0080 0000              R0      EQU     0
0081 0001              R1      EQU     1
0082 0002              R2      EQU     2
0083 0003              R3      EQU     3
0084 0000              Z       EQU     0
0085 0001              P       EQU     1
0086 0002              N       EQU     2
0087 0003              UN      EQU     3
0088 0000                      ORG     H'3800'
0089 3800              LABUF   RES     H'722'
0090 3F22                      RES     1
0091 3F23              PRFLAG  RES     1
0092 3F24              FLAG3   RES     1
0093 3F25              BUF3    RES     4
0094 3F29              CRTL    RES     1
0095 3F2A              BUF8    RES     4
0096 3F2E              BUF6    RES     3
0097 3F31              COUNT2  RES     2
0098 3F33              NRERR   RES     1
0099 3F34              STADD   RES     2
0100 3F36              PAGCNT  RES     1
0101 3F37              LINENR  RES     2
0102 3F39              ADDRES  RES     2
0103 3F3B              ENDFLG  RES     1
0104 3F3C              PASS    RES     1
0105 3F3D              MAXLAB  RES     2
0106 3F3F              LSTLAB  RES     2
0107 3E41              LANR    RES     2
0108 3F43              POINT4  RES     2
0109 3F45              BUF1    RES     40
0110 3F6D              TEL1    RES     2
0111 3F6F              CRTL1   RES     1
0112 3F70              POINT5  RES     2
```

```
LINE ADDR  OBJECT  E SOURCE

0113 3F72             ADRTYP RES     1
0114 3F73             OPC1   RES     1
0115 3F74             LINPAG RES     1
0116 3F75             CHARNR RES     1
0117 3F76             REG0A  RES     1
0118 3F77             REG3A  RES     1
0119 3F78             REG2A  RES     1
0120 3F79             REG1A  RES     1
0121 3F7A             REGOBJ RES     1
0122 3F7B             BUF5   RES     72
0123 3FC3             CHACNT RES     1
0124 3FC4             LABADR RES     2
0125 3FC6             BYTCOD RES     1
0126 3FC7             BYTE1  RES     1
0127 3FC8             BYTE2  RES     1
0128 3FC9             BYTE3  RES     1
01   3FCA             BUF4   RES     13
0130 3FD7             ABUF   RES     2
0131 3FD9             NEGCON RES     1
0132 3FDA             TEKEN  RES     1
0133 3FDB             STRLEN RES     1
0134 3FDC             SRCPNT RES     1
0135 3FDD             CONTRL RES     1
0136 3FDE             INDIR  RES     1
0137 3FDF             HAAK   RES     1
0138 3FE0             STRCOM RES     1
0139 3FE1             DECMSB RES     1
0140 3FE2             DECLSB RES     1
0141 3FE3             BUF9   RES     18
0142 3FF5             BCDBUF RES     4
0143 3FF9             RES    1
0144 3FFA             REG2   RES     1
0145 3FFB             REG3   RES     1
0146 3FFC             DATAS  RES     1
0147 3FFD             NRBYTS RES     1
01   3FFE             CHECK  RES     1
0149 3FFF             CHSTOR RES     1
0150                  ********************************************************************
0151 4000                    ORG     H'2E00'
0152 2E00 040D        CRLF   LODI,R0 H'0D'    CR
0153 2E02 3B35               BSTR,UN WRCHAR
0154 2E04 3B27               BSTR,UN DELAY
0155 2E06 040A        LF     LODI,R0 H'0A'    LF
0156 2E08 3B2F               BSTR,UN WRCHAR
0157 2E0A 1B21               BCTR,UN DELAY
0158                  ********************************************************************
0159 2E0C 04C0        LEESTT LODI,R0 H'C0'
0160 2E0E E0                 WRTC,R0         MAGNEET LEZER IN
0161 2E0F 7710        LEESCH PPSL    H'10'    REG SEL
0162 2E11 0500               LODI,R1 0
0163 2E13 0608               LODI,R2 8        8 BITS SERIEEL LEZEN
0164 2E15 12          LOOP20 SPSU             TEST SENSE
0165 2E16 1A7D               BCTR,N  LOOP20
0166 2E18 E1                 WRTC,R1         MAGNEET LEZER LOS
0167 2E19 3B17               BSTR,UN DEL3
0168 2E1B 3B10        LOOP21 BSTR,UN DELAY
```

```
LINE ADDR  OBJECT  E SOURCE

0169 2E1D 12                SPSU
0170 2E1E 4480              ANDI,R0 H'80'
0171 2E20 51                RRR,R1
0172 2E21 61                IORZ    R1      VOEG BIT TOE AAN R1
0173 2E22 C1                STRZ    R1
0174 2E23 FA76              BDRR,R2 LOOP21
0175 2E25 3B06              BSTR,UN DELAY
0176 2E27 457F              ANDI,R1 H'7F'   CLEAR PARITEITS BIT
0177 2E29 01                LODZ    R1      CHAR IN R0
0178 2E2A 7518              CPSL    H'18'   REG SEL,GEEN CARRY
0179 2E2C 17                RETC,UN
0180                        ********************************************************************
0181 2E2D 20        DELAY   EORZ    R0
0182 2E2E F87E      DEL1    BDRR,R0 DEL1
0183 2E30 F87E      DEL2    BDRR,R0 DEL2
0184 2E32 F87E      DEL3    BDRR,R0 DEL3
0185 2E34 04E5              LODI,R0 H'E5'
0186 2E36 F87E      DEL4    BDRR,R0 DEL4
0187 2E38 17                RETC,UN
0188                        ********************************************************************
0189 2E39 7710      WRCHAR  PPSL    H'10'   REG SEL
0190 2E3B 7640              PPSU    H'40'
0191 2E3D C2                STRZ    R2
0192 2E3E C3                STRZ    R3
0193 2E3F 0508              LODI,R1 8
0194 2E41 2B6A              BSTR,UN DELAY
0195 2E43 3B68              BSTR,UN DELAY
0196 2E45 7440              CPSU    H'40'   SCHRIJF FLAG
0197 2E47 3B64      LOOP22  BSTR,UN DELAY
0198 2E49 52                RRR,R2
0199 2E4A 1A04              BCTR,N  EENBIT
0200 2E4C 7440              CPSU    H'40'
0201 2E4E 1B02              BCTR,UN NULBIT
0202 2E50 7640      EENBIT  PPSU    H'40'
0203 2E52 F973      NULBIT  BDRR,R1 LOOP22
0204 2E54 3B57              BSTR,UN DELAY
0205 2E56 7640              PPSU    H'40'
0206 2E58 03                LODZ    R3
0207 2E59 7510              CPSL    H'10'
0208 2E5B 17                RETC,UN
0209                        ********************************************************************
0210 2E5C 0701      WRT1BL  LODI,R3 1
0211 2E5E 0420      WRTBL   LODI,R0 A' '
0212 2E60 3B57              BSTR,UN WRCHAR
0213 2E62 FB7A              BDRR,R3 WRTBL
0214 2E64 17                RETC,UN
0215                        ********************************************************************
0216 2E65 CD1FFF    WHEX    STRA,R1 CHSTOR
0217 2E68 3B27              BSTR,UN TEST    UPDATE CHECK CHAR
0218 2E6A 51                RRR,R1
0219 2E6B 51                RRR,R1
0220 2E6C 51                RRR,R1
0221 2E6D 51                RRR,R1
0222 2E6E 450F              ANDI,R1 H'0F'
0223 2E70 0D6E81            LODA,R0 ASCII,R1
0224 2E73 3F2E39            BSTA,UN WRCHAR
```

```
LINE ADDR  OBJECT  E SOURCE

0225 2E76 0D1FFF            LODA,R1 CHSTOR
0226 2E79 450F              ANDI,R1 H'0F'
0227 2E7B 0D6E81            LODA,R0 ASCII,R1
0228 2E7E 1F2E39            BCTA,UN WRCHAR
0229                        ************************************************************
0230 2E81 30313233  ASCII   DATA    H'0123456789ABCDEF'
     2E85 34353637
     2E89 38394142
     2E8D 43444546
0231                        ************************************************************
0232 2E91 01        TEST    LODZ    R1      UPDATE CHECK CHAR
0233 2E92 2C1FFE            EORA,R0 CHECK
0234 2E95 D0                RRL,R0
0235 2E96 CC1FFE            STRA,R0 CHECK
0236 2E99 17                RETC,UN
0237                        ************************************************************
0238 2E9A CF1F77    LABEL   STRA,R3 REG3A   SAVE R3
0239 2E9D 0704              LODI,R3 4
0240 2E9F 20                EORZ    R0
0241 2EA0 CC1F29            STRA,R0 CRTL
0242 2EA3 0F5F2A    LODCH   LODA,R0 BUF8,R3,-
0243 2EA6 E420              COMI,R0 A' '
0244 2EA8 9803              BCFR,Z  ZOEK
0245 2EAA 20                EORZ    R0      BLANKS=00
0246 2EAB 1B08              BCTR,UN STOCHL
0247 2EAD A410      ZOEK    SUBI,R0 H'10'
0248 2EAF E430              COMI,R0 H'30'   CIJFERS?
0249 2EB1 1A02              BCTR,N  STOCHL
0250 2EB3 A430              SUBI,R0 H'30'
0251 2EB5 CF7F2A    STOCHL  STRA,R0 BUF8,R3
0252 2EB8 5B69              BRNR,R3 LODCH
0253 2EBA 0D1F2A            LODA,R1 BUF8
0254 2EBD 0C1F2B            LODA,R0 BUF8+1
0255 2EC0 D1                RRL,R1
0256 2EC1 D1                RRL,R1
0257 2EC2 50                RRR,R0
0258 2EC3 50                RRR,R0
0259 2EC4 50                RRR,R0
0260 2EC5 50                RRR,R0
0261 2EC6 C2                STR2    R2
0262 2EC7 4403              ANDI,R0 H'03'
0263 2EC9 81                ADDZ    R1
0264 2ECA 1A1D              BCTR,N  CRTL1A
0265 2ECC CC1F2E            STRA,R0 BUF6
0266 2ECF 46F0              ANDI,R2 H'F0'
0267 2ED1 0D1F2C            LODA,R1 BUF8+2
0268 2ED4 51                RRR,R1
0269 2ED5 51                RRR,R1
0270 2ED6 01                LODZ    R1
0271 2ED7 440F              ANDI,R0 H'0F'
0272 2ED9 82                ADDZ    R2
0273 2EDA CC1F2F            STRA,R0 BUF6+1
0274 2EDD 45C0              ANDI,R1 H'C0'
0275 2EDF 8D1F2D            ADDA,R1 BUF6-1
0276 2EE2 CD1F30            STRA,R1 BUF6+2
0277 2EE5 0F1F77            LODA,R3 REG3A
```

```
LINE ADDR  OBJECT  E SOURCE

0278 2EE8 17                RETC,UN
0279                        ********************************************************************
0280 2EE9 0501        CRTL1A  LODI,R1 1
0281 2EEB CD1F29            STRA,R1 CRTL
0282 2EEE 0F1F77            LODA,R3 REG3A
0283 2EF1 17                RETC,UN
0284                        ********************************************************************
0285 2EF2 0600        FILAB   LODI,R2 0       FIND LABEL
0286 2EF4 CF1F77            STRA,R3 REG3A
0287 2EF7 0700              LODI,R3 0
0288 2EF9 0437              LODI,R0 H'37'
0289 2EFB CC1F43            STRA,R0 POINT4
0290 2EFE 049C              LODI,R0 H'9C'
0291 2F00 CC1F44            STRA,R0 POINT4+1        START ADRES PREDEFINED LABE
0292 2F03 7708              PPSL    H'08'
0293 2F05 1B11              BCTR,UN LOD1
0.                          ********************************************************************
0295 2F07 7501        VLGLAB  CPSL    H'01'
0296 2F09 0C1F44            LODA,R0 POINT4+1
0297 2F0C 81                ADDZ    R1      VOLGENDE LABEL
0298 2F0D CC1F44            STRA,R0 POINT4+1
0299 2F10 0C1F43            LODA,R0 POINT4
0300 2F13 8400              ADDI,R0 0
0301 2F15 CC1F42            STRA,R0 POINT4
0302 2F18 0500        LOD1    LODI,R1 0
0303 2F1A 0DFF43            LODA,R0 *POINT4,R1      LOAD 1E BYTE GECOMPRIMEERDE
0304 2F1D 447F              ANDI,R0 H'7F'
0305 2F1F 1B03              BCTR,UN NXT
0306 2F21 0DFF43      LOAD    LODA,R0 *POINT4,R1
0307 2F24 E47B        NXT     COMI,R0 H'7B'   EINDE LABEL LIST
0308 2F26 1821              BCTR,Z  NTFND
0309 2F28 ED3F2D            COMA,R0 BUF6-1,R1,+
0310 2F2B 1812              BCTR,Z  ENDLAB  3 CHAR GETEST?
0311 2F2D DB02              BIRR,R3 NXTCHR
0312 2F2F DA00              BIRR,R2 NXTCHR
0.   2F31 EE1F3F    NXTCHR  COMA,R2 LSTLAB  LAATSE LABEL?
0314 2F34 9805              BCFR,Z  LAB7
0315 2F36 EF1F40            COMA,R3 LSTLAB+1
0316 2F39 180E              BCTR,Z  NTFND
0317 2F3B 0505        LAB7    LODI,R1 5       VOLGENDE LABEL
0318 2F3D 1B48              BCTR,UN VLGLAB
0319 2F3F E503        ENDLAB  COMI,R1 3
0320 2F41 985E              BCFR,Z  LOAD
0321 2F43 7508        RETULA  CPSL    H'08'
0322 2F45 0F1F77            LODA,R3 REG3A
0323 2F48 17                RETC,UN
0324                        ********************************************************************
0325 2F49 04FF        NTFND   LODI,R0 H'FF'
0326 2F4B CC1F43            STRA,R0 POINT4
0327 2F4E CC1F44            STRA,R0 POINT4+1
0328 2F51 1B70              BCTR,UN RETULA
0329                        ********************************************************************
0330 2F53 0700        ENTTAP  LODI,R3 0       ENTER CHAR BIJ TAPE
0331 2F55 0D1F23      GETCH   LODA,R1 PRFLAG
0332 2F58 1E2FBA            BCTA,N  TTYRED
0333 2F5B 3F2000            BSTA,UN H'2000' HSP PAPER TAPE READER ROUTINE OP AD
```

```
LINE ADDR  OBJECT  E SOURCE

0334 2F5E E418        CNTRED COMI,R0 H'18'   DELETE LINE
0335 2F60 1871               BCTR,Z  ENTTAP
0336 2F62 E45F               COMI,R0 H'5F'   DELETE CHARACTER
0337 2F64 1838               BCTR,Z  NXGET
0338 2F66 E40D               COMI,R0 H'0D'   CR
0339 2F68 183D               BCTR,Z  NULBF5
0340 2F6A E40A               COMI,R0 H'0A'   LF
0341 2F6C 1C2FB6             BCTA,Z  SETMSB
0342 2F6F E420               COMI,R0 A' '
0343 2F71 1A62               BCTR,N  GETCH
0344 2F73 E45A               COMI,R0 A'Z'
0345 2F75 9906               BCFR,P  CHAR
0346 2F77 445F               ANDI,R0 H'5F'   UPPER CASE CHAR?
0347 2F79 E45A               COMI,R0 A'Z'
0348 2F7B 1958               BCTR,P  GETCH   ZO NEE,VOLGENDE CHAR
0349 2F7D E430        CHAR   COMI,R0 A'0'
034A 2F7F 1A0A               BCTR,N  CONTR1
0351 2F81 E441               COMI,R0 A'A'
0352 2F83 9A04               BCFR,N  MSB1    LETTERS
0353 2F85 E439               COMI,R0 A'9'
0354 2F87 1902               BCTR,P  CONTR1
0355 2F89 6480        MSB1   IORI,R0 H'80'   MSB=1 BIJ LF,CIJFERS,LETTERS
0356 2F8B CF3F7A      CONTR1 STRA,R0 BUF5-1,R3,+
0357 2F8E E747               COMI,R3 71       BUFFER VOL?
0358 2F90 9943               BCFR,P  GETCH   ZO NEE,VOLGENDE CHAR
0359 2F92 20          CLBF5  EORZ    R0       SCHRIJF NULL IN REST BUF5
0360 2F93 CF1FC3      CLBUF5 STRA,R3 CHACNT
0361 2F96 E747        RETBF5 COMI,R3 71
0362 2F98 15                 RETC,P
0363 2F99 CF3F7A             STRA,R0 BUF5-1,R3,+
0364 2F9C 1B78               BCTR,UN RETBF5
0365                  ********************************************************
0366 2F9E E700        NXGET  COMI,R3 0
0367 2FA0 1802               BCTR,Z  BRGET
0368 2FA2 A701               SUBI,R3 1
0369 2FA4 1F2F55      BRGET  BCTA,UN GETCH
0370                  ********************************************************
0371 2FA7 5B02        NULBF5 BRNR,R3 CLWRT
0372 2FA9 1B79               BCTR,UN BRGET   ALS NIET EERSTE CHAR,REST BUF5 =00,
0373                  ********************************************************
0374 2FAB 20          CLWRT  EORZ    R0
0375 2FAC CF3F7A             STRA,R0 BUF5-1,R3,+     CLEAR REST BUF5
0376 2FAF 6500               IORI,R1 0       SET STATUS PRFLAG
0377 2FB1 3E2E39             BSTA,N  WRCHAR  ALS NIET HSPT READER,SCHRIJF CHAR
0378 2FB4 1B5D               BCTR,UN CLBUF5
0379                  ********************************************************
0380 2FB6 5B53        SETMSB BRNR,R3 CONTR1  ALS NIET EERSTE CHAR,MSB 1
0381 2FB8 1B6A               BCTR,UN BRGET   ALS EERSTE CHAR,GET NEW CHAR
0382                  ********************************************************
0383 2FBA 3F2E0C      TTYRED BSTA,UN LEESTT
0384 2FBD 1F2F5E             BCTA,UN CNTRED
0385                  ********************************************************
0386 2FC0 0F1F75      ENDREG LODA,R3 CHARNR  EINDE REGEL?
0387 2FC3 0F3F7A      LOOP23 LODA,R0 BUF5-1,R3,+      ZO JA,CRTL-1,ZO NEE CRTL-
0388 2FC6 180E               BCTR,Z  REGEND  CHAR =00,DAN EINDE REGEL
0389 2FC8 E420               COMI,R0 A' '
```

```
LINE ADDR  OBJECT  E SOURCE

0390 2FCA 1877            BCTR,Z  LOOP23
0391 2FCC FB00            BDRR,R3 FOUTIN
0392 2FCE 20        FOUTIN EORZ   R0
0393 2FCF CF1F75    RETIN  STRA,R3 CHARNR
0394 2FD2 CC1F29           STRA,R0 CRTL
0395 2FD5 17               RETC,UN
0396                ********************************************************************
0397 2FD6 0401      REGEND LODI,R0 1
0398 2FD8 1875             BCTR,UN RETIN
0399                ********************************************************************
0400 2FDA 0C1F3C    DMPOBJ LODA,R0 PASS    IN PASS 3,DUMP 1 REGEL OBJECT CODE
0401 2FDD 447F             ANDI,R0 H'7F'
0402 2FDF E403             COMI,R0 3       PASS 3
0403 2FE1 16               RETC,N
0404 2FE2 15               RETC,P
0405 2FE3 0E1F24           LODA,R2 FLAG3
0406 2FE6 14               RETC,Z          FLAG3=AANTAL BYTES TE DUMPEN
0407 2FE7 1904             BCTR,P  GR10    FLAG3=0--RETURN
0408 2FE9 0600             LODI,R2 0       FLAG3<H'10'--1E 16 BYTES BUF1,DAN E
0409 2FEB 1B09             BCTR,UN DUMP    FLAG3>H'10'--1E 16 BYTES BUF1,COPY
0410 2FED E610      GR10   COMI,R2 H'10'   FLAG3=N--EIND BLOK CODE
0411 2FEF 1D3057           BCTA,P  SUB10
0412 2FF2 20               EORZ   R0
0413 2FF3 CC1F24           STRA,R0 FLAG3
0414 2FF6 CE1FFD    DUMP   STRA,R2 NRBYTS
0415 2FF9 3F3099           BSTA,UN FR8NUL
0416 2FFC 3F2E00           BSTA,UN CRLF
0417 2FFF 20               EORZ   R0
0418 3000 CC1FFE           STRA,R0 CHECK
0419 3003 043A             LODI,R0 A':'
0420 3005 3F2E29           BSTA,UN WRCHAR
0421 3008 0D1F34           LODA,R1 STADD
0422 300B 3F2E65           BSTA,UN WHEX
0423 300E 0D1F35           LODA,R1 STADD+1
0424 3011 3F2E65           BSTA,UN WHEX
0425 3014 0D1F34           LODA,R1 STADD
0426 3017 0E1F35           LODA,R2 STADD+1
0427 301A 0C1FFD           LODA,R0 NRBYTS
0428 301D 3F24A0           BSTA,UN ADNR    ADD NR OF BYTES TO STADD
0429 3020 CD1F34           STRA,R1 STADD
0430 3023 CE1F35           STRA,R2 STADD+1
0431 3026 0D1FFD           LODA,R1 NRBYTS
0432 3029 3F2E65           BSTA,UN WHEX
0433 302C 0D1FFE           LODA,R1 CHECK
0434 302F 3F2E65           BSTA,UN WHEX
0435 3032 0C1F24           LODA,R0 FLAG3
0436 3035 16               RETC,N
0437 3036 0600             LODI,R2 0
0438 3038 0E3E40    LOOPDP LODA,R0 BUF1-1,R2,+
0439 303B C1               STRZ   R1
0440 303C 3F2E65           BSTA,UN WHEX
0441 303F 8D1F35           COMA,R2 NRBYTS
0442 3042 1A04             BCTR,N  LOOPDP  DUMP BUF1
0443 3044 0D1FFE           LODA,R1 CHECK
0444 3047 3F2E65           BSTA,UN WHEX
0445 304A 0D1F24           LODA,R1 FLAG3
```

```
LINE ADDR  OBJECT  E SOURCE

0446 3040 14                 RETC,2
0447 3042 0E7F54       LOOP24 LODA,R0 BUF1+15,R2
0448 3045 CE7F44             STRA,R0 BUF1-1,R2
0449 3048 FA78               BDRR,R2 LOOP24
0450 304A 17                 RETC,UN
0451                   ********************************************************************
0452 304B A610         SUBI0  SUBI,R2 H'10'
0453 304D CE1F24             STRA,R2 FLAG3
0454 3050 0610               LODI,R2 H'10'
0455 3052 1F2FF6             BCTA,UN DUMP
0456                   ********************************************************************
0457 3055 0C1F43       PT4PL2 LODA,R1 POINT4  POINT4+2
0458 3058 0E1F44             LODA,R2 POINT4+1
0459 305B 8602               ADDI,R2 2
0460 305D 7708               PPSL   H'03'
0461 305F 8400               ADDI,R1 0
0462 3061 7308               CPSL   H'03'
0463 3063 CD1F43             STRA,R1 POINT4
0464 3066 CE1F44             STRA,R2 POINT4+1
0465 3069 17                 RETC,UN
0466                   ********************************************************************
0467 306A 0C1F33       INCERR LODA,R0 NRERR   NR ERRORS+1
0468 306D D800               BIRR,R0 INCNRE
0469 306F CC1F33       INCNRE STRA,R0 NRERR
0470 3072 17                 RETC,UN
0471                   ********************************************************************
0472 3073 0F1F75       INCCNT LODA,R3 CHARNR
0473 3076 DB00               BIRR,R3 INCNRC
0474 3078 CF1F70       INCNRC STRA,R3 CHARNR
0475 307B 17                 RETC,UN
0476                   ********************************************************************
0477 307C 0C1F38       INCLIN LODA,R0 LINENR-1        INCREMENT LINE NR
0478 307F 0D1F37             LODA,R1 LINENR
0479 3082 D805               BIRR,R0 GORLN
0480 3084 D900               BIRR,R1 CARLIN
0481 3086 CD1F37       CARLIN STRA,R1 LINENR
0482 3089 CC1F38       GORLN  STRA,R0 LINENR+1
0483 308C 17                 RETC,UN
0484                   ********************************************************************
0485 308D 0708         PRSNUL LODI,R3 8
0486 308F 0400         LOOP25 LODI,R0 0        SCHRIJF 8 NULL (HEADER PAPER TAPE)
0487 3091 3F2E39             BSTA,UN WRCHAR
0488 3094 FB7B               BDRR,R3 LOOP25
0489 3096 17                 RETC,UN
0490                   ********************************************************************
0491 3097 0505         HEADER LODI,R1 5
0492 3099 3672         LOOP26 BSTR,UN PRSNUL  PUNS HEADER VAN 40 NULL
0493 309B F97C               BDRR,R1 LOOP26
0494 309D 17                 RETC,UN
0495                   ********************************************************************
0496 309E 0E1F36       NEWPAG LODA,R2 PAGCNT
0497 30A1 DA00               BIRR,R2 STRP
0498 30A3 CE1F36       STRP   STRA,R2 PAGCNT  NIEUWE PAGINA,KOPREGEL ETC
0499 30A6 0434               LODI,R0 52        52 REGELS PER PAGINA
0500 30A8 CC1F74             STRA,R0 LINCNT
0501 30AB 0C1F3C             LODP,R0 PASS
```

```
LINE ADDR  OBJECT  E SOURCE

0502 30BA 44BF            ANDI,R0 H'BF'
0503 30BC E402            COMI,R0 2
0504 30BE 16              RETC,N
0505 30BF 15              RETC,P  PRINT ALLEN BIJ PASS 2
0506 30C0 3F2E00          BSTA,UN CRLF
0507 30C3 0704            LODI,R3 4
0508 30C5 3F2E06    LOOP27 BSTA,UN LF
0509 30C8 FB7B            BDRR,R3 LOOP27
0510 30CA 07FF            LODI,R3 H'FF'
0511 30CC 0F310C    LOOP28 LODA,R0 MES8,R3,+       "2650 ASSEMBLER VER 1"
0512 30CF 3F2E39          BSTA,UN WRCHAR
0513 30D2 E717            COMI,R3 23
0514 30D4 9876            BCFR,Z  LOOP28
0515 30D6 0728            LODI,R3 40
0516 30D8 0F5F45    LOOP29 LODA,R0 BUF1,R3,-
0517 30DB 3F2E39          BSTA,UN WRCHAR
0518 30DE 5878            BRNR,R3 LOOP29
0519 30E0 07FF            LODI,R3 H'FF'
0520 30E2 0F3123    LOOP30 LODA,R0 MES9,R3,+       "PAGE "
0521 30E5 3F2E39          BSTA,UN WRCHAR
0522 30E8 E705            COMI,R3 5
0523 30EA 9876            BCFR,Z  LOOP30
0524 30EC 0500            LODI,R1 0
0525 30EE 02              LODZ    R2      LOAD PAGE NR
0526 30EF 3F314B          BSTA,UN BINBCD
0527 30F2 0702            LODI,R3 2
0528 30F4 3F31A1          BSTA,UN PRBCD
0529 30F7 3F2E00          BSTA,UN CRLF
0530 30FA 3F2E06          BSTA,UN LF
0531 30FD 07FF            LODI,R3 H'FF'
0532 30FF 0F3129    LOOP31 LODA,R0 MES10,R3,+
0533 3102 3F2E39          BSTA,UN WRCHAR  "LINE ADDR B1 B2 B3 B4 ERROR SOURCE
0534 3105 E721            COMI,R3 33
0535 3107 9876            BCFR,Z  LOOP31
0536 3109 1F2E00          BCTA,UN CRLF
0537                      ********************************************************************
0538 310C 20323635  MES8  DATA    A' 2650 ASSEMBLER VER 1  '
     3110 30204153
     3114 53454D42
     3118 4C455220
     311C 56455220
     3120 312020
0539 3123 20504147  MES9  DATA    A' PAGE '
     3127 4520
0540 3129 4C494E45  MES10 DATA    A'LINE ADDR B1 B2 B3 B4 ERROR SOURCE'
     312D 20414444
     3131 52204231
     3135 20423220
     3139 42332042
     313D 34204552
     3141 524F5220
     3145 534F5552
     3149 4345
0541                      ********************************************************************
0542 314B CE1FFA    BINBCD STRA,R2 REG2
0543 314E CF1FFB           STRA,R3 REG3
```

```
LINE ADDR  OBJECT  E SOURCE

0544 3151 7708              PPSL    H'08'
0545 3153 457F              ANDI,R1 H'7F'
0546 3155 0708              LODI,R3 8
0547 3157 06FF       LOOP33 LODI,R2 H'FF'
0548 3159 7701       LOOP34 PPSL    H'01'    SET CARRY BIT
0549 315B DA00              BIRR,R2 INCR2
0550 315D AF7198     INCR2  SUBA,R0 BASE-1,R3
0551 3160 CC1FFC            STRA,R0 DATAS
0552 3163 01                LODZ    R1
0553 3164 AF7197            SUBA,R0 BASE-2,R3
0554 3167 C1                STRZ    R1
0555 3168 0C1FFC            LODA,R0 DATAS
0556 316B 6500              IORI,R1 0        SET STATUS
0557 316D 9A6A              BCFR,N  LOOP34   NOG NIET NEGATIEF
0558 316F 7501              CPSL    H'01'
05   3171 8F7198            ADDA,R0 BASE-1,R3       TEL BASE ER WEER BIJ OP
0560 3174 CC1FFC            STRA,R0 DATAS
0561 3177 01                LODZ    R1
0562 3178 8F7197            ADDA,R0 BASE-2,R3
0563 317B C1                STRZ    R1
0564 317C 7501              CPSL    H'01'
0565 317E 53                RRR,R3
0566 317F 02                LODZ    R2
0567 3180 CF7FF5            STRA,R0 BCDBUF,R3
0568 3183 0C1FFC            LODA,R0 DATAS
0569 3186 D3                RRL,R3
0570 3187 7701              PPSL    H'01'
0571 3189 A702              SUBI,R3 2
0572 318B 984A              BCFR,Z  LOOP33
0573 318D CC1FF5            STRA,R0 BCDBUF
0574 3190 0E1FFA            LODA,R2 REG2
0575 3193 0F1FFB            LODA,R3 REG3
0576 3196 7508              CPSL    H'08'
0577 3198 17                RETC,UN
0    ********************************************************************
0579 3199 000A0064   BASE   DATA    H'00,0A,00,64,03,E8,27,10       10,100,1000
     319D 03E82710
0580 ********************************************************************
0581 31A1 0F5FF5     PRBCD  LODA,R0 BCDBUF,R3,-
0582 31A4 9802              BCFR,Z  GEENL2
0583 31A6 5808              BRNR,R3 LZSUP    LEADING ZERO SUPPRESSION
0584 31A8 0430       GEENL2 ADDI,R0 H'30'
0585 31AA 3F2E39            BSTA,UN WRCHAR
0586 31AD 5808              BRNR,R3 GETDAT
0587 31AF 17                RETC,UN
0588 31B0 0420       LZSUP  LODI,R0 H' '
0589 31B2 3F2E39            BSTA,UN WRCHAR
0590 31B5 1B6A              BCTR,UN PRBCD
0591 31B7 0F5FF5     GETDAT LODA,R0 BCDBUF,R3,-
0592 31BA 1B6C              BCTR,UN GEENL2
0593 ********************************************************************
0594 31BC 0504       GETLAB LODI,R1 4        TEST OP BLANK (CRTL=0)
0595 31BE 0420       LOOP35 LODI,R0 H' '
0596 31C0 CD5F2A            STRA,R0 BUF8,R1,-       TEST OP 'OF + OF   (CRTL=1)
0597 31C3 5979              BRNR,R1 LOOP35   EINDE REGEL (CRTL=FF)
0598 31C5 0F1FF5            LODA,R3 CHARNR   IETS ANDERS (CRTL=2)
```

```
LINE ADDR  OBJECT  E SOURCE

0599 31C8 0F3F7A      LOOP36 LODA,R0 BUF5-1,R3,+
0600 31CB 1818               BCTR,Z  NOTFND
0601 31CD 9A1A               BCFR,N  TESTS   GEEN CIJFERS,LETTERS,LF?
0602 31CF 447F               ANDI,R0 H'7F'   CLEAR MSB
0603 31D1 CB3F29             STRA,R0 BUF8-1,R1,+
0604 31D4 E504               COMI,R1 4
0605 31D6 9B7A               BCFR,Z  LOOP36
0606 31D8 0F7F7B             LODA,R0 BUF5,R3
0607 31DB 1808               BCTR,Z  NOTFND
0608 31DD E420               COMI,R0 A' '
0609 31DF 980E               BCFR,Z  TSTAC   TEST ACCENT ETC
0610 31E1 0500        CRTL0  LODI,R1 0
0611 31E3 1B1C               BCTR,UN RETRN
0612                  ********************************************************************
0613 31E5 05FF        NOTFND LODI,R1 H'FF'
0614 31E7 1B18               BCTR,UN RETRN
0615                  ********************************************************************
0616  31E9 A701       TESTS  SUBI,R3 1
0617 31EB E420               COMI,R0 A' '
0618 31ED 1872               BCTR,Z  CRTL0
0619 31EF E42C        TSTAC  COMI,R0 A','
0620 31F1 180C               BCTR,Z  CRTL1B
0621 31F3 E42B               COMI,R0 A'+'
0622 31F5 1808               BCTR,Z  CRTL1B
0623 31F7 E42D               COMI,R0 A'-'
0624 31F9 1804               BCTR,Z  CRTL1B
0625 31FB 0502               LODI,R1 2
0626 31FD 1B02               BCTR,UN RETRN
0627                  ********************************************************************
0628 31FF 0501        CRTL1B LODI,R1 1
0629 3201 CD1F29      RETRN  STRA,R1 CRTL
0630 3204 CF1F75             STRA,R3 CHARNR
0631 3207 17                 RETC,UN
0632                  ********************************************************************
0633 3208 0C1F3C      PRLIN  LODA,R0 PASS
0634 320B 44BF               ANDI,R0 H'BF'
0635  320D E402              COMI,R0 2       PRINT ONLY IF PASS 2
0636 320F 16                 RETC,N
0637 3210 15                 RETC,P
0638 3211 3F2E00             BSTA,UN CRLF
0639 3214 0D1F37             LODA,R1 LINENR
0640 3217 0C1F38             LODA,R0 LINENR+1
0641 321A 3F314B             BSTA,UN BINBCD
0642 321D 0704               LODI,R3 4       PRINT LINE NR IN 4 DIGITS
0643 321F 3F31A1             BSTA,UN PRBCD
0644 3222 0C1F7B             LODA,R0 BUF5
0645 3225 E42A               COMI,R0 A'*'
0646 3227 9808               BCFR,Z  WRADR   ALS GEEN COMMENT,SCHRIJF ADRES EN D
0647 3229 0718               LODI,R3 24
0648 322B 3F2E5E             BSTA,UN WRTBL   SCHRIJF 24 BLANKS
0649 322E 1E229D             BCTA,UN PRSOUR  PRINT SOURCE
0650                  ********************************************************************
0651 3231 3F2E5C      WRADR  BSTA,UN WRT1BL  SCHRIJF 1 BLANK
0652 3234 0D1F39             LODA,R1 ADDRES
0653 3237 3F2E65             BSTA,UN WHEX
0654 323A 0D1F3A             LODA,R1 ADDRES+1
```

```
LINE ADDR  OBJECT  E SOURCE

0655 3230 3F2E65            BSTA,UN WHEX
0656 3240 3F2E5C            BSTA,UN WRT1BL
0657 3243 070E              LODI,R3 H'0E'
0658 3245 0E1F72            LODA,R2 ADRTYP
0659 3248 E601              COMI,R2 1
0660 324A 980B              BCFR,Z  GEENER
0661 324C 0E1F73            LODA,R2 OPC1
0662 324F E603              COMI,R2 3
0663 3251 1804              BCTR,Z  GEENER
0664 3253 E606              COMI,R2 6
0665 3255 9832              BCFR,Z  PRERR   PRINT ERRORS
0666 3257 0E1FC6      GEENER LODA,R2 BYTCOD
0667 325A E605              COMI,R2 5
0668 325C 1A02              BCTR,N  KL5     4 BYTES OF MINDER OBJECT CODE ?
0669 325E 0604              LODI,R2 4
0670 3260 CE1F77      KL5     STRA,R2 REG3A
0671 3263 CE1F76            STRA,R2 REG0A
0672 3266 06FF              LODI,R2 H'FF'
0673 3268 0E3FC7      LOOP38  LODA,R0 BYTE1,R2,+
0674 326B C1                STRZ    R1
0675 326C 3F2E65            BSTA,UN WHEX
0676 326F 3F2E5C            BSTA,UN WRT1BL
0677 3272 0F1F77            LODA,R3 REG3A
0678 3275 A701              SUBI,R3 1
0679 3277 CF1F77            STRA,R3 REG3A
0680 327A 5B6C              BRNR,R3 LOOP38
0681 327C 0C1F76            LODA,R0 REG0A
0682 327F 070B              LODI,R3 H'0B'
0683 3281 F802        LOOP39 BDRR,R0 NOG
0684 3283 1B04              BCTR,UN PRERR
0685 3285 A703        NOG     SUBI,R3 3
0686 3287 1B78              BCTR,UN LOOP39
0687                  ********************************************************
0688 3289 A701        PRERR   SUBI,R3 1
0689 328B 3F2E5E            BSTA,UN WRTBL   VUL MET BLANKS OP
0690 328E 0600              LODI,R2 0
0691 3290 0E3F24      LOOP40  LODA,R0 BUF3-1,R2,+
0692 3293 3F2E39            BSTA,UN WRCHAR
0693 3296 E604              COMI,R2 4
0694 3298 9876              BCFR,Z  LOOP40
0695 329A 3F2E5C            BSTA,UN WRT1BL
0696 329D 0700        PRSOUR  LODI,R3 0
0697 329F 0F3F7A      LOOP41  LODA,R0 BUF5-1,R3,+
0698 32A2 1807              BCTR,Z  KLRPRN  ALS DATA IS 00,EINDE REGEL
0699 32A4 3F2E39            BSTA,UN WRCHAR
0700 32A7 E72C              COMI,R3 44
0701 32A9 9874              BCFR,Z  LOOP41
0702 32AB 0C1F74      KLRPRN  LODA,R0 LINPAG
0703 32AE A401              SUBI,R0 1
0704 32B0 CC1F74            STRA,R0 LINPAG
0705 32B3 3C30AA            BSTA,Z  NEWPAG
0706 32B6 0D1FC6            LODA,R1 BYTCOD
0707 32B9 E505              COMI,R1 5
0708 32BB 16                RETC,N
0709 32BC 0403              LODI,R0 3
0710 32BE CC1F78            STRA,R0 REG2A
```

```
LINE ADDR  OBJECT  E SOURCE

0711 32C1 0600                LODI,R2 0
0712 32C3 51                  RRR,R1
0713 32C4 9A02                BCFR,N  ROTA
0714 32C6 8601                ADDI,R2 1
0715 32C8 51            ROTA  RRR,R1
0716 32C9 9A02                BCFR,N  AND
0717 32CB 8602                ADDI,R2 2
0718 32CD 453F          AND   ANDI,R1 H'3F'
0719 32CF CE1F7A              STRA,R2 REGOBJ
0720 32D2 F902          LSTBYT BDRR,R1 STR1
0721 32D4 1B3B                BCTR,UN WROBJ
0722 32D6 CD1F79        STR1  STRA,R1 REG1A
0723 32D9 3F2E00              BSTA,UN CRLF
0724 32DC 070A                LODI,R3 10
0725 32DE 3F2E5E              BSTA,UN WRTBL
0726 32E1 0704                LODI,R3 4
0727 32E3 CF1F77              STRA,R3 REG3A
07   32E6 0E1F78              LODA,R2 REG2A
0729 32E9 0E3FC7        LOOP43 LODA,R0 BYTE1,R2,+
0730 32EC C1                  STRZ    R1
0731 32ED 3F2E65              BSTA,UN WHEX
0732 32F0 3F2E5C              BSTA,UN WRT1BL
0733 32F3 0F1F77              LODA,R3 REG3A
0734 32F6 A701                SUBI,R3 1
0735 32F8 CF1F77              STRA,R3 REG3A
0736 32FB 5B6C                BRNR,R3 LOOP43
0737 32FD CE1F72              STRA,R2 REG2A
0738 3300 0C1F74              LODA,R0 LINPAG
0739 3303 A401                SUBI,R0 1
0740 3305 CD1F74              STRA,R1 LINPAG
0741 3308 2C30AA              BSTA,Z  NEWPAG
0742 330B 0D1F79              LODA,R1 REG1A
0743 330E 1E22D2              BCTA,UN LSTBYT
0744                    ********************************************************************
0745 3311 0F1E7A        WROBJ LODA,R3 REGOBJ
0746 3314 5B01                BRNR,R3 NOTEMP  BUF 5 LEEG?
0   3316 17                   RETC,UN
0748 3317 3F2E00        NOTEMP BSTA,UN CRLF
0749 331A CF1E77              STRA,R3 REG3A
0750 331D 070A                LODI,R3 10
0751 331F 3F2E5E              BSTA,UN WRTBL
0752 3322 0E1F78              LODA,R2 REG2A
0753 3325 0E3FC7        LOOP44 LODA,R0 BYTE1,R2,+
0754 3328 C1                  STRZ    R1
0755 3329 3F2E65              BSTA,UN WHEX
0756 332C 3F2E5C              BSTA,UN WRT1BL
0757 332F 0F1E77              LODA,R3 REG3A
0758 3332 A701                SUBI,R3 1
0759 3334 CF1E77              STRA,R3 REG3A
0760 3337 5B6C                BRNR,R3 LOOP44
0761 3339 0C1E74              LODA,R0 LINPAG
0762 333C A401                SUBI,R0 1
0763 333E CC1E74              STRA,R0 LINPAG
0764 3341 1C30AA              BCTA,Z  NEWPAG
0765 3344 17                  RETC,UN
0766                    ********************************************************************
```

```
LINE ADDR  OBJECT  E SOURCE

0767 3345 3F2FC0      CONTST BSTA,UN ENDREG  EINDE REGEL?
0768 3348 15                 RETC,F           20 JA,RETURN
0769 3349 CF1FDC             STRA,R3 SRCPNT
0770 334C 0501               LODI,R1 1
0771 334E CD1FD9             STRA,R1 NEGCON
0772 3351 20                 EORZ    R0
0773 3352 CC1FDE             STRA,R0 INDIR
0774 3355 CC1FD7             STRA,R0 ABUF
0775 3358 CC1FD8             STRA,R0 ABUF+1
0776 335B 06FF               LODI,R2 H'FF'
0777 335D 0F3F7A             LODA,R0 BUF5-1,R3,+
0778 3360 E43E               COMI,R0 A'>'
0779 3362 1808               BCTR,Z  STPOIN
0780 3364 0600               LODI,R2 0
0781 3366 E43C               COMI,R0 A'<'
0782 3368 9808               BCFR,Z  STHAAK
07   336A 0601               LODI,R2 1
0784 336C CF1FDC      STPOIN STRA,R3 SRCPNT
0785 336F 0F3F7A             LODA,R0 BUF5-1,R3,+
0786 3372 CE1FDF      STHAAK STRA,R2 HAAK
0787 3375 E42A               COMI,R0 A'*'
0788 3377 9811               BCFR,Z  STNR
0789 3379 0401               LODI,R0 1
0790 337B CC1FDE             STRA,R0 INDIR
0791 337E CF1FDC      PLUS   STRA,R3 SRCPNT
0792 3381 EF1FC3             COMA,R3 CHACNT
0793 3384 9E3475             BCFA,N  CRTL11
0794 3387 0F3F7A             LODA,R0 BUF5-1,R3,+
0795 338A CF1F75      STNR   STRA,R3 CHARNR
0796 338D 0501               LODI,R1 1
0797 338F CD1FD9             STRA,R1 NEGCON
0798 3392 E424        COMTEK COMI,R0 A'$'
0799 3394 1C342E             BCTA,Z  DOLLAR
0800 3397 E42B               COMI,R0 A'+'
0801 3399 1863               BCTR,Z  PLUS
08   339B E42D               COMI,R0 A'-'
0803 339D 1C343A             BCTA,Z  MINUS
0804 33A0 E42C               COMI,R0 A','
0805 33A2 1C3453             BCTA,Z  COMMA
0806 33A5 0F7F7B             LODA,R0 BUF5,R3
0807 33A8 E427               COMI,R0 H'27'    ACCENT
0808 33AA 1C3406             BCTA,Z  ACCENT
0809 33AD 0F7F7A             LODA,R0 BUF5-1,R3
0810 33B0 9E3475             BCFA,N  CRTL11
0811 33B3 E4C1               COMI,R0 H'C1'
0812 33B5 1E344B             BCTA,N  STDOL    CIJFERS,DAN $ IN BUF8
0813 33B8 FB00               BDRR,R3 NRMIN1
0814 33BA CF1F75      NRMIN1 STRA,R3 CHARNR
0815 33BD 3F31BC             BSTA,UN GETLAB
0816 33C0 E502               COMI,R1 2
0817 33C2 1C3475             BCTA,Z  CRTL11
0818 33C5 3F2E9A             BSTA,UN LABEL    COMPRESS LABEL
0819 33C8 0C1F29             LODA,R0 CRTL
0820 33CB 9C3475             BCFA,Z  CRTL11
0821 33CE 3F2EF2             BSTA,UN FILAB
0822 33D1 0D1F43             LODA,R1 POINT4
```

```
LINE ADDR  OBJECT  E SOURCE

0823 33D4 1E3479            BCTA,N  CRTLFF
0824 33D7 3F3061            BSTA,UN PT4PL2
0825 33DA 0701              LODI,R3 1
0826 33DC 0FFF43            LODA,R0 *POINT4,R3
0827 33DF C1                STRZ    R1
0828 33E0 0F6F43            LODA,R0 *POINT4,R3,+
0829 33E3 C2                STRZ    R2
0830 33E4 3F347D            BSTA,UN RELADR
0831 33E7 0F1F75      TSTCOM LODA,R3 CHARNR
0832 33EA 0F7F7B            LODA,R0 BUF5,R3
0833 33ED 1C3453            BCTA,Z  COMMA
0834 33F0 E420              COMI,R0 A' '
0835 33F2 1C3453            BCTA,Z  COMMA
0836 33F5 E42C              COMI,R0 A','
0837 33F7 1C3453            BCTA,Z  COMMA
0838 33FA E42B              COMI,R0 A'+'
0839 33FC 1C337E            BCTA,Z  PLUS
083A 33FF E42D              COMI,R0 A'-'
0841 3401 1837              BCTR,Z  MINUS
0842 3403 1F3475            BCTA,UN CRTL11
0843                  ********************************************************************
0844 3406 3F34B4      ACCENT BSTA,UN STRING
0845 3409 9C3475            BCFA,Z  CRTL11  FOUT?
0846 340C 0C1FDB            LODA,R0 STRLEN
0847 340F E401              COMI,R0 1
0848 3411 1E3475            BCTA,N  CRTL11  STRING LENGTE <1 IS FOUT
0849 3414 1811              BCTR,Z  BUF90   WORDT 00-BYTE
0850 3416 E402              COMI,R0 2
0851 3418 1D3475            BCTA,P  CRTL11
0852 341B 0D1FE3            LODA,R1 BUF9
0853 341E 0E1FE4            LODA,R2 BUF9+1  WORDT BYTE1-BYTE2
0854 3421 3F347D      RELA  BSTA,UN RELADR
0855 3424 1F33E7            BCTA,UN TSTCOM
0856                  ********************************************************************
0857 3427 0500        BUF90 LODI,R1 0
0858 3429 0E1FE3            LODA,R2 BUF9
0859 342C 1B73              BCTR,UN RELA
0860                  ********************************************************************
0861 342E 0D1F31      DOLLAR LODA,R1 COUNT2
0862 3431 0E1F32            LODA,R2 COUNT2+1
0863 3434 3F347D            BSTA,UN RELADR
0864 3437 1F33E7            BCTA,UN TSTCOM
0865                  ********************************************************************
0866 343A 05FF        MINUS LODI,R1 H'FF'
0867 343C CD1FD9            STRA,R1 NEGCON
0868 343E CF1FDC            STRA,R3 SRCPNT
0869 3442 0F3F7A            LODA,R0 BUF5-1,R3,+
0870 3445 CF1F75            STRA,R3 CHARNR
0871 3448 1F3392            BCTA,UN COMTEK
0872                  ********************************************************************
0873 344B 0424        STDOL LODI,R0 A'$'
0874 344D CC1F2A            STRA,R0 BUF8
0875 3450 1F3406            BCTA,UN ACCENT
0876                  ********************************************************************
0877 3453 EF1FDC      COMMA COMA,R3 SRCPNT
0878 3456 1C3473            BCTA,Z  CRTPL3
```

```
LINE ADDR  OBJECT  E SOURCE

0879 3459 0C1FDF            LODA,R0 HAAK
0880 345C 1806              BCTR,Z  STOCRT
0881 345E 190B              BCTR,P  BUFP1
0882 3460 20        RETCM   EORZ    R0
0883 3461 CC1FD7            STRA,R0 ABUF
0884 3464 CC1F29    STOCRT  STRA,R0 CRTL
0885 3467 CF1F75            STRA,R3 CHARNR
0886 346A 17                RETC,UN
0887 346B 0C1FD7    BUFP1   LODA,R0 ABUF
0888 346E CC1FD8            STRA,R0 ABUF+1
0889 3471 1B6D              BCTR,UN RETCM
0890                ********************************************************************
0891 3473 DB00      CRTPL3  BIRR,R3 CRTL11
0892 3475 0401      CRTL11  LODI,R0 1
0893 3477 1B6B              BCTR,UN STOCRT
0894                ********************************************************************
08   3479 04FF      CRTLFF  LODI,R0 H'FF'
0896 347B 1B67              BCTR,UN STOCRT
0897                ********************************************************************
0898 347D 0C1FD9    RELADR  LODA,R0 NEGCON
0899 3480 1A11              BCTR,N  COMREL
0900 3482 8E1FD8    ADABF   ADDA,R2 ABUF+1
0901 3485 7708              PPSL    H'08'
0902 3487 8D1FD7            ADDA,R1 ABUF
0903 348A 7508              CPSL    H'08'
0904 348C CD1FD7            STRA,R1 ABUF
0905 348F CE1FD8            STRA,R2 ABUF+1
0906 3492 17                RETC,UN
0907                ********************************************************************
0908 3493 3B13      COMREL  BSTR,UN COMPL2
0909 3495 1B6B              BCTR,UN ADABF
0910                ********************************************************************
0911 3497 7501      ROTA16  CPSL    H'01'
0912 3499 7708              PPSL    H'08'
0913 349B D2                RRL,R2
09   349C D1                RRL,R1
0915 349D 7508      CLPSW   CPSL    H'08'
0916 349F 17                RETC,UN
0917                ********************************************************************
0918 34A0 82        ADNR    ADDZ    R2
0919 34A1 C2                STRZ    R2
0920 34A2 7708              PPSL    H'08'
0921 34A4 8500              ADDI,R1 0
0922 34A6 1B75              BCTR,UN CLPSW
0923                ********************************************************************
0924 34A8 25FF      COMPL2  EORI,R1 H'FF'
0925 34AA 26FF              EORI,R2 H'FF'
0926 34AC 8601              ADDI,R2 1
0927 34AE 7708              PPSL    H'08'
0928 34B0 8500              ADDI,R1 0
0929 34B2 1B69              BCTR,UN CLPSW
0930                ********************************************************************
0931 34B4 20        STRING  EORZ    R0
0932 34B5 CC1FDB            STRA,R0 STRLEN
0933 34B8 CC1FDD            STRA,R0 CONTRL
0934 34BB 0711              LODI,R3 17
```

```
LINE ADDR  OBJECT  E SOURCE

0935 34BD CF5FE3     LOOP59 STRA,R0 BUF9,R3,-
0936 34C0 567B              BRNR,R3 LOOP59
0937 34C2 0501              LODI,R1 1
0938 34C4 CD1FDA            STRA,R1 TEKEN
0939 34C7 0F1F75            LODA,R3 CHARNR
0940 34CA 0F7F7A            LODA,R0 BUF5-1,R3
0941 34CD C2                STRZ    R2
0942 34CE 0F3F7A            LODA,R0 BUF5-1,R3,+
0943 34D1 E427              COMI,R0 H'27'   ACCENT
0944 34D3 981B              BCFR,Z  GEENAC
0945 34D5 E6C2              COMI,R2 H'C2'   B STRING
0946 34D7 1824              BCTR,Z  BINSTR
0947 34D9 E6CF              COMI,R2 H'CF'   O STRING
0948 34DB 1C35DC            BCTA,Z  OCTSTR
0949 34DE E6C4              COMI,R2 H'C4'   D STRING
0950 34E0 1C3625            BCTA,Z  DECSTR
0951 34E3 E6C8              COMI,R2 H'C8'   H STRING
0952 34E5 1C352D            BCTA,Z  HEXSTR
0953 34E8 E6C1              COMI,R2 H'C1'   A STRING
0954 34EA 1C36B6            BCTA,Z  ASCSTR
0955 34ED 1F36EF            BCTA,UN CRTL1S  FOUT
0956                 ********************************************************************
0957 34F0 0E1F2A     GEENAC LODA,R2 BUF8
0958 34F3 E624              COMI,R2 A'$'
0959 34F5 9C36F3            BCFA,Z  CRTFFS
0960 34F8 A702              SUBI,R3 2
0961 34FA 1F3625            BCTA,UN DECSTR
0962                 ********************************************************************
0963 34FD 0500       BINSTR LODI,R1 0
0964 34FF CD1FE0            STRA,R1 STRCON
0965 3502 0600              LODI,R2 0
0966 3504 EE1FC3            COMA,R2 CHACNT
0967 3507 9AA5              BCFR,N  +FTADR1
0968 3509 0F3F7A            LODA,R0 BUF5-1,R3,+
0969 350C 9A15              BCFR,N  BIT80B
0970 350E A4B0       LOOP45 SUBI,R0 H'B0'
0971 3510 E401              COMI,R0 1
0972 3512 199A              BCTR,P  +FTADR1 IN BINAIRE STRING ALLEEN GETALLEN 0
0973 3514 3F3497            BSTA,UN ROTA16
0974 3517 3F34A0            BSTA,UN ADNR
0975 351A 1A92              BCTR,N  +FTADR1
0976 351C 0F3F7A     LOOP46 LODA,R0 BUF5-1,R3,+
0977 351F 9A13              BCFR,N  TSTACC
0978 3521 1B6B              BCTR,UN LOOP45
0979 3523 E42D       BIT80B COMI,R0 A'-'
0980 3525 9809              BCFR,Z  TSTFLB  TEST +
0981 3527 04FF              LODI,R0 H'FF'
0982 3529 CC1FDA            STRA,R0 TEKEN
0983 352C 1B6E              BCTR,UN LOOP46
0984                 ********************************************************************
0985 352E 36EF       FTADR1 ACON    CRTL1S
0986                 ********************************************************************
0987 3530 E42B       TSTFLB COMI,R0 A'+'
0988 3532 1868              BCTR,Z  LOOP46
0989 3534 E427       TSTACC COMI,R0 H'27'   ACCENT
0990 3536 9C3585            BCFA,Z  COMCOM  COMPARE COMMA
```

```
LINE ADDR  OBJECT  E SOURCE

0991 3539 0402      LOOP47 LODI,R0 2
0992 353B CC1FDD           STRA,R0 CONTRL
0993 353E CF1F75      LOOP48 STRA,R3 CHARNR
0994 3541 0F1FDB           LODA,R3 STRLEN
0995 3544 0C1FDA           LODA,R0 TEKEN
0996 3547 3E34A8           BSTA,N  COMPL2
0997 354A 01               LODZ    R1
0998 354B 1807             BCTR,Z  BORROW
0999 354D E4FF             COMI,R0 H'FF'
1000 354F 1803             BCTR,Z  BORROW
1001 3551 CF3FE2           STRA,R0 BUF9-1,R3,+
1002 3554 02          BORROW LODZ    R2
1003 3555 CF3FE2           STRA,R0 BUF9-1,R3,+
1004 3558 CF1FDB           STRA,R3 STRLEN
1005 355B 0401             LODI,R0 1
1006 355D CC1FDA           STRA,R0 TEKEN
1007 3560 E710             COMI,R3 16      MEER DAN 16 IN STRING?
100C 3562 191C             BCTR,P  CRTL2S
1009 3564 0C1FDD           LODA,R0 CONTRL
1010 3567 1D36E5           BCTA,P  KLAARS
1011 356A 0F1F75           LODA,R3 CHARNR
1012 356D 0C1FE0           LODA,R0 STRCON
1013 3570 1C34FD           BCTA,Z  BINSTR
1014 3573 E401             COMI,R0 1
1015 3575 1C358D           BCTA,Z  HEXSTR
1016 3578 E402             COMI,R0 2
1017 357A 1C35DC           BCTA,Z  OCTSTR
1018 357D 1F3625           BCTA,UN DECSTR
1019                ********************************************************************
1020 3580 0402      CRTL2S LODI,R0 2
1021 3582 1F36EB           BCTA,UN STCRTL
1022                ********************************************************************
1023 3585 E42C      COMCOM COMI,R0 A',
1024 3587 1C353E           BCTA,Z  LOOP48
1025 358A 1F36EF      BRC1S BCTA,UN CRTL1S  FOUT
1026                ********************************************************************
102  358D 0501      HEXSTR LODI,R1 1
1028 358F CD1FE0           STRA,R1 STRCON
1029 3592 0500             LODI,R1 0
1030 3594 0600             LODI,R2 0
1031 3596 EF1FC3           COMA,R3 CHACNT
1032 3599 9A6F             BCFR,N  BRC1S   ALS LAATSTE CHAR GEEN ' DAN FOUT
1033 359B 0F3F7A           LODA,R0 BUF5-1,R3,+
1034 359E 9A2A             BCFR,N  BIT80H
1035 35A0 447F        TSTHEX ANDI,R0 H'7F'
1036 35A2 E446             COMI,R0 A'F'
1037 35A4 1964             BCTR,P  BRC1S   ALS >F DAN FOUT
1038 35A6 A430             SUBI,R0 H'30'
1039 35A8 E409             COMI,R0 9
1040 35AA 9902             BCFR,P  KLN10
1041 35AC A407             SUBI,R0 7
1042 35AE CF1F76      KLN10 STRA,R3 REG0A
1043 35B1 0704             LODI,R3 4
1044 35B3 3F3497      LOOP58 BSTA,UN ROTA16
1045 35B6 1A52             BCTR,N  BRC1S   FOUT
1046 35B8 FB79             BDRR,R3 LOOP58
```

```
LINE ADDR  OBJECT  E SOURCE

1047 35BA 3F34A0          BSTA,UN ADNR
1048 35BD 1A4B            BCTR,N  BRC1S
1049 35BF 0F1F76          LODA,R3 REG0A
1050 35C2 0F3F7A    LOOP49 LODA,R0 BUF5-1,R3,+
1051 35C5 9E3534          BCFA,N  TSTACC
1052 35C8 1B56            BCTR,UN TSTHEX
1053 35CA E42D      BIT80H COMI,R0 A'-'
1054 35CC 9807            BCFR,Z  TSTPLS
1055 35CE 04FF            LODI,R0 H'FF'
1056 35D0 CC1FDA          STRA,R0 TEKEN
1057 35D3 1B6D            BCTR,UN LOOP49
1058 35D5 E42B      TSTPLS COMI,R0 A'+'
1059 35D7 1869            BCTR,Z  LOOP49
1060 35D9 1F3534          BCTA,UN TSTACC
1061                      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
1062 35DC 0502      OCTSTR LODI,R1 2
1063 35DE CD1FE0          STRA,R1 STRCON
1064 35E1 0500            LODI,R1 0
1065 35E3 0600            LODI,R2 0
10   35E5 EF1FC3          COMA,R3 CHACNT
1067 35E8 9AB9            BCFR,N  +FOUTAD
1068 35EA 0F3F7A          LODA,R0 BUF5-1,R3,+
1069 35ED 9A22            BCFR,N  BIT80D
1070 35EF A4B0      TSTOCT SUBI,R0 H'B0'
1071 35F1 E407            COMI,R0 7
1072 35F3 19AE            BCTR,P  *FOUTAD
1073 35F5 CF1F76          STRA,R3 REG0A
1074 35F8 0703            LODI,R3 3
1075 35FA 3E3497    LOOP50 BSTA,UN ROTA16
1076 35FD 1AA4            BCTR,N  *FOUTAD
1077 35FF FB79            BDRR,R3 LOOP50
1078 3601 3F34A0          BSTA,UN ADNR
1079 3604 1A9D            BCTR,N  *FOUTAD
1080 3606 0F1F76          LODA,R3 REG0A
1081 3609 0F3F7A    LOOP51 LODA,R0 BUF5-1,R3,+
1082 360C 9E3534          BCFA,N  TSTACC
1083 360F 1B5E            BCTR,UN TSTOCT
1084 3611 E42D      BIT80D COMI,R0 A'-'
10   3613 9807            BCFR,Z  TSTPLO
1086 3615 04FF            LODI,R0 H'FF'
1087 3617 CC1FDA          STRA,R0 TEKEN
1088 361A 1B6D            BCTR,UN LOOP51
1089 361C E42B      TSTPLO COMI,R0 A'+'
1090 361E 1869            BCTR,Z  LOOP51
1091 3620 1F3534          BCTA,UN TSTACC
1092                      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
1093 3623 36EE      FOUTAD ACON    CRTL1S
1094                      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
1095 3625 0503      DECSTR LODI,R1 3
1096 3627 CD1FE0          STRA,R1 STRCON
1097 362A 0500            LODI,R1 0
1098 362C 0600            LODI,R2 0
1099 362E EF1FC3          COMA,R3 CHACNT
1100 3631 9AF0            BCFR,N  +FOUTAD
1101 3633 0F3F7A          LODA,R0 BUF5-1,R3,+
1102 3636 9E3687          BCFA,N  BIT80D
```

```
LINE ADDR  OBJECT  E SOURCE

1103 3639 A4B0        TSTDEC SUBI,R0 H'B0'
1104 363B E409               COMI,R0 9
1105 363D 19E4               BCTR,P  *FOUTAD
1106 363F 3F3497             BSTA,UN ROTA16
1107 3642 1ADF               BCTR,N  *FOUTAD
1108 3644 CD1FE1             STRA,R1 DECMSB
1109 3647 CE1FE2             STRA,R2 DECLSB
1110 364A 3F3497             BSTA,UN ROTA16
1111 364D 1AD4               BCTR,N  *FOUTAD
1112 364F 3F3497             BSTA,UN ROTA16
1113 3652 1ACF               BCTR,N  *FOUTAD
1114 3654 8E1FE2             ADDA,R2 DECLSB
1115 3657 7708               PPSL    H'08'
1116 3659 8D1FE1             ADDA,R1 DECMSB
1117 365C 7508               CPSL    H'08'
1118 365E 1AC3               BCTR,N  *FOUTAD
1119 3660 3F34A0             BSTA,UN ADNR
1120 3663 1E36A6             BCTA,N  BRFOUT
1121 3666 0F3F7A      LOOP52 LODA,R0 BUF5-1,R3,+
1122 3669 9A10               BCFR,N  TSTMND  TEST -
1123 366B E489               COMI,R0 H'B9'
1124 366D 994A               BCFR,P  TSTDEC
1125 366F 0C1F2A      LOOP53 LODA,R0 BUF8
1126 3672 E424               COMI,R0 A'$'
1127 3674 9830               BCFR,Z  BRFOUT
1128 3676 A702               SUBI,R3 2
1129 3678 1F3539             BCTA,UN LOOP47
1130 367B E42D        TSTMND COMI,R0 A'-'
1131 367D 1804               BCTR,Z  NXTCH1
1132 367F E42B               COMI,R0 A'+'
1133 3681 9813               BCFR,Z  COMPAC
1134 3683 8701        NXTCH1 ADDI,R3 1
1135 3685 1868               BCTR,UN LOOP53
1136 3687 E42D        BITS0D COMI,R0 A'-'
1137 3689 9807               BCFR,Z  TSTPLD
1138 368B 04FF               LODI,R0 H'FF'
1139 368D CC1FDA             STRA,R0 TEKEN
1140 3690 1854               BCTR,UN LOOP52
1141 3692 E42B        TSTPLD COMI,R0 A'+'
1142 3694 1850               BCTR,Z  LOOP52
1143 3696 E427        COMPAC COMI,R0 H'27'    ACCENT
1144 3698 1C3539             BCTA,Z  LOOP47
1145 369B E42C               COMI,R0 A','
1146 369D 180A               BCTR,Z  VERG2
1147 369F 0C1F2A             LODA,R0 BUF8
1148 36A2 E424               COMI,R0 A'$'
1149 36A4 180B               BCTR,Z  CHARM1
1150 36A6 1F35EF      BPFOUT BCTA,UN CRTL1S
1151                  ********************************************************************
1152 36A9 0C1F73      VERG2  LODA,R0 OPC1
1153 36AC E403               COMI,R0 3
1154 36AE 1C353E             BCTA,Z  LOOP48
1155 36B1 A701        CHARM1 SUBI,R3 1
1156 36B3 1F3539             BCTA,UN LOOP47
1157                  ********************************************************************
1158 36B6 EF1FC3      ASCSTR COMA,R3 CHACNT
```

```
LINE ADDR  OBJECT  E SOURCE

1159 36B9 9A6B             BCFR,N  BRFOUT
1160 36BB 0500             LODI,R1 0
1161 36BD 0F3F7A      LOOP55 LODA,R0 BUF5-1,R3,+
1162 36C0 447F             ANDI,R0 H'7F'
1163 36C2 1862             BCTR,Z  BRFOUT
1164 36C4 E427             COMI,R0 H'27'   ACCENT
1165 36C6 180A             BCTR,Z  ENDSTR
1166 36C8 CD3FE2      STBUF9 STRA,R0 BUF9-1,R1,+
1167 36CB E510             COMI,R1 16
1168 36CD 996E             BCFR,P  LOOP55
1169 36CF 1F3580           BCTA,UN CRTL2S
1170                  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
1171 36D2 0F3F7A      ENDSTR LODA,R0 BUF5-1,R3,+
1172 36D5 1806             BCTR,Z  KLSTRG
1173 36D7 E427             COMI,R0 H'27'   ACCENT
1174 36D9 9802             BCFR,Z  KLSTRG
11   36DB 1B6B             BCTR,UN STBUF9
11                    ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
1177 36DD CD1FDB      KLSTRG STRA,R1 STRLEN
1178 36E0 A701             SUBI,R3 1
1179 36E2 CF1F75           STRA,R3 CHARNR
1180 36E5 0C1FDB      KLAARS LODA,R0 STRLEN
1181 36E8 1805             BCTR,Z  CRTL1S
1182 36EA 20               EORZ    R0
1183 36EB CC1F29      STCRTL STRA,R0 CRTL
1184 36EE 17               RETC,UN
1185                  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
1186 36EF 0401        CRTL1S LODI,R0 1
1187 36F1 1B78             BCTR,UN STCRTL
1188                  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
1189 36F3 04FF        CRTFFS LODI,R0 H'FF'
1190 36F5 1B74             BCTR,UN STCRTL
1191                  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
1192 36F7 0500        CALADR LODI,R1 0
1193 36F9 0E1F32           LODA,R2 COUNT2+1
11   36FC 8602             ADDI,R2 2
11   36FE 7708             PPSL    H'08'
1196 3700 8D1F31           ADDA,R1 COUNT2
1197 3703 7508             CPSL    H'08'
1198 3705 0C1FD8           LODA,R0 ABUF+1
1199 3708 A2               SUBZ    R2
1200 3709 C2               STRZ    R2
1201 370A 0C1FD7           LODA,R0 ABUF
1202 370D 7708             PPSL    H'08'
1203 370F A1               SUBZ    R1
1204 3710 C1               STRZ    R1
1205 3711 7508        RELMAX CPSL    H'08'
1206 3713 980C             BCFR,Z  COM1FF
1207 3715 E63F             COMI,R2 H'3F'
1208 3717 1912             BCTR,P  R0FF
1209 3719 0C1FDE      INDBIT LODA,R0 INDIR
1210 371C 14               RETC,Z
1211 371D 6680             IORI,R2 H'80'
1212 371F 20               EORZ    R0
1213 3720 17               RETC,UN
1214                  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

```
LINE ADDR  OBJECT  E SOURCE

1215 3721 E5FF        COM1FF COMI,R1 H'FF'
1216 3723 9806               BCFR,Z  R0FF
1217 3725 467F               ANDI,R2 H'7F'
1218 3727 E640               COMI,R2 H'40'
1219 3729 9A6E               BCFR,N  INDBIT
1220 372B 04FF        R0FF   LODI,R0 H'FF'
1221 372D 17                 RETC,UN
1222                  ********************************************************************
1223 372E                    ORG     H'379C'
1224 379C CA000000    EQLST  DATA    H'CA,00,00,00,00'      R0 EQU 0
     37A0 00
1225 37A1 CA100000           DATA    H'CA,10,00,00,01'      R1 EQU 1
     37A5 01
1226 37A6 CA200000           DATA    H'CA,20,00,00,02'      R2 EQU 2
     37AA 02
1227 37AB CA300000           DATA    H'CA,30,00,00,03'      R3 EQU 3
     37AF 03
1228 37B0 DC300000           DATA    H'DC,30,00,00,08'      WC EQU H'08'
     37B4 08
1229 37B5 C9300000           DATA    H'C9,30,00,00,10'      RS EQU H'10'
     37B9 10
1230 37BA 8CF34000           DATA    H'8C,F3,40,00,02'      COM EQU H'02'
     37BE 02
1231 37BF 8C148000           DATA    H'8C,14,80,00,01'      CAR EQU H'01'
     37C3 01
1232 37C4 CC533300           DATA    H'CC,53,93,00,80'      SENS EQU H'80'
     37C8 80
1233 37C9 98C04700           DATA    H'98,C0,47,00,40'      FLAG EQU H'40'
     37CD 40
1234 37CE A4300000           DATA    H'A4,90,00,00,20'      II EQU H'20'
     37D2 20
1235 37D3 A440C000           DATA    H'A4,40,C0,00,20'      IDC EQU H'20'
     37D7 20
1236 37D8 BD618000           DATA    H'BD,61,80,00,04'      OVF EQU H'04'
     37DC 04
1237 37DD E8000000           DATA    H'E8,00,00,00,00'      Z EQU 0
     37E1 00
1238 37E2 C0000000           DATA    H'C0,00,00,00,01'      P EQU 1
     37E6 01
1239 37E7 E8000000           DATA    H'E8,00,00,00,02'      N EQU 2
     37EB 02
1240 37EC 95100000           DATA    H'95,10,00,00,00'      EQ EQU 0
     37F0 00
1241 37F1 9D400000           DATA    H'9D,40,00,00,01'      GT EQU 1
     37F5 01
1242 37F6 B1400000           DATA    H'B1,40,00,00,02'      LT EQU 2
     37FA 02
1243 37FB D4E00000           DATA    H'D4,E0,00,00,03'      UN EQU 3
     37FF 03
1244 0000                    END     0

TOTAL ASSEMBLY ERRORS = 0000
```