

NASA TECHNICAL MEMORANDUM

NASA TM X- 72648
COPY NO.

NASA TM X- 72648

(NASA-TM-X-72648) AN AUTOMATED PROGRAM FOR
REINFORCEMENT REQUIREMENTS FOR OPENINGS IN
CYLINDRICAL PRESSURE VESSELS (NASA) 48 p HC
\$3.75 CSCL 20K

N75-17738

G3/39

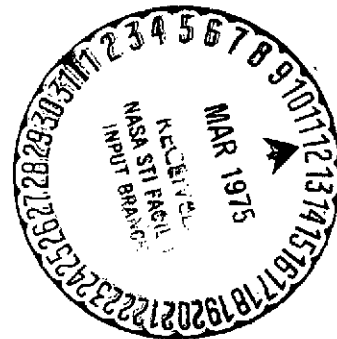
Unclas
11082

AN AUTOMATED PROGRAM FOR REINFORCEMENT REQUIREMENTS
FOR OPENINGS IN CYLINDRICAL PRESSURE VESSELS

By

John F. Wilson and John T. Taylor

January 1975



This informal documentation medium is used to provide accelerated or special release of technical information to selected users. The contents may not meet NASA formal editing and publication standards, may be revised, or may be incorporated in another publication.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER, HAMPTON, VIRGINIA 23665

1. Report No. TMX 72648	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle An Automated Program for Reinforcement Requirements for Openings in Cylindrical Pressure Vessels		5. Report Date January 1975	6. Performing Organization Code
		8. Performing Organization Report No.	
7. Author(s) John F. Wilson and John T. Taylor		10. Work Unit No.	
		11. Contract or Grant No.	
9. Performing Organization Name and Address National Aeronautics and Space Administration Langley Research Center Hampton, VA 23665		13. Type of Report and Period Covered Technical Memorandum	
		14. Sponsoring Agency Code	
12. Sponsoring Agency Name and Address National Aeronautics and Space Administration Washington, DC 20546			
15. Supplementary Notes Programmed for use on Hewlett-Packard 9810A Calculator			
16. Abstract This paper describes an automated "interactive" program for calculating the reinforcement requirements for openings in cylindrical pressure vessels subjected to internal pressure. The equations are from the 1974 edition of the ASME Boiler and Pressure Vessel Code, Section VIII, Division I. The program is written for an electronic desk top calculator. The program calculates the required area of reinforcement for a given opening and compares this value with the area of reinforcement provided by a proposed design. All program steps, operating instructions, and example problems with input and sample output are documented.			
17. Key Words (Suggested by Author(s)) (STAR category underlined) Automated Design (Interactive) Penetration Openings Pressure Vessel Reinforcement		18. Distribution Statement Unclassified - Unlimited	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 48	22. Price* \$3.75

*Available from { The National Technical Information Service, Springfield, Virginia 22151
STIF/NASA Scientific and Technical Information Facility, P.O. Box 33, College Park, MD 20740

AN AUTOMATED PROGRAM FOR REINFORCEMENT REQUIREMENTS
FOR OPENINGS IN CYLINDRICAL PRESSURE VESSELS

By

John F. Wilson and John T. Taylor

TABLE OF CONTENTS

	<u>Page</u>
Summary	1
Description	2
Notation - Symbols and Definitions	3
Fig. 1 - Geometry of Reinforced Opening	7
Numerical Examples and Calculator Printout	
Example 1 - Nonreinforced	8
Example 2 - Pad Reinforced	10
Example 3 - Integral Nozzle	13
Program Variable - Storage Locations	16
Flow Diagram	17
Computer Program	
Control Card	25
Tape 1 - File 0	25
Tape 1 - File 1	34
Operating Hints	45
Concluding Remarks	47
References	47

AN AUTOMATED PROGRAM FOR REINFORCEMENT REQUIREMENTS
FOR OPENINGS IN CYLINDRICAL PRESSURE VESSELS

By

John F. Wilson and John T. Taylor

NASA

LANGLEY RESEARCH CENTER

HAMPTON, VIRGINIA

SUMMARY

This paper presents an interactive, automated design solution for reinforcement requirements for openings in pressure vessels using the methods in the 1974 edition of the ASME Boiler and Pressure Vessel Code, Section VIII, Division I, Paragraph UG 36 - UG 41, pages 28 - 34 and Paragraph UA 280, pages 353 - 361 (reference 1). The design equations used in this program are restricted to cylindrical vessels under internal pressure designed in accordance with Paragraph UG 27.

The program allows for the determination of reinforcement requirements for a given opening. It considers the contribution of metal in the shell and nozzle not needed to restrain pressure, an inner projection of a nozzle, weld metal, and inside and outside reinforcing pads. Only metal inside the limits of reinforcement is considered. It is the responsibility of the designer to insure use of code materials, allowable stresses, design configurations, welding techniques, and special requirements.

The program (approximately 3500 program steps and 41 storage registers) was written for use with a Hewlett-Packard Model 9810A Calculator and 9865A Cassette Memory (reference 2). For users not having Cassette Memory, instructions are provided for using just the calculator.

DESCRIPTION

This program was written, utilizing the design equations of the ASME Boiler and Pressure Vessel Code, Section VIII, Division I, (Paragraphs UG-36 - UG-41 and UA-280), to calculate the area of reinforcement required for an opening in a cylindrical pressure vessel under internal pressure. The area of reinforcement required is compared to the area of reinforcement provided by the proposed configuration. The program considers the following as available reinforcement: metal in the shell and nozzle not needed to restrain pressure, weld metal, an inner projection of a nozzle, and reinforcing pads. Only metal within the limits of reinforcement is considered.

The program is designed to be interactive with the user and it interrogates the user for the required input information. The user has the responsibility to insure that all input information conforms to code requirements. To operate the program, a proposed opening configuration is assumed. The required area of reinforcement is then calculated and compared with that available (assuming no reinforcing pads). If the reinforcement is sufficient, the program is terminated. If more reinforcement is required, the program asks for information on pad configuration(s) and updates metal available for reinforcement. If sufficient reinforcement is not provided by the proposed pad configuration(s), the program will ask for new pad configuration(s). This process will be repeated until the reinforcement requirements are met. The program is terminated when sufficient reinforcement is provided. However, if the area of reinforcement provided is greater than the area required, the user may optimize his design by executing an option to select new reinforcing pad configuration(s).

The program is limited only by conditions imposed by the Code.

To aid the individual in using this program, three items are included. First, a diagram for the program calculation flow including equations and major decision points is shown on pp. 17-24. Second, the computer storage location of the program variables is presented on p. 16. Third, the complete source documentation for the computer program is listed on pp. 25-44.

AN AUTOMATED PROGRAM FOR REINFORCEMENT REQUIREMENTS
FOR OPENINGS IN CYLINDRICAL PRESSURE VESSELS

NOTATION SYMBOLS AND DEFINITIONS

ALL SYMBOLS ARE SHOWN IN THE ORDER THEY APPEAR IN THE PROGRAM

The definitions and figures that are referred to as UG-, UR-, and UW- are those given in the 1974 ASME Boiler and Pressure Vessel Code, Section VIII, Division I (Reference 1).

- P = design pressure, pounds per square inch (see UG-21), (or maximum allowable working pressure for existing vessels, see UG-98)
- RS = inside radius of the shell course under consideration, before corrosion allowance is added, inches
- RN = inside radius of the nozzle course under consideration, before corrosion allowance is added, inches
- SS = maximum allowable stress value for the shell material, pounds per square inch (see applicable table of stress values in Subsection C)
- SN = maximum allowable stress value for the nozzle material, pounds per square inch (see applicable table of stress values in Subsection C)
- ES = joint efficiency for, or the efficiency of, appropriate joint in cylindrical shells and any joint in spherical shells, or the efficiency of ligaments between openings whichever is less:
For welded vessels, use the efficiency specified in UW-12.
For riveted joints, use the efficiency specified in UR-15.
For ligaments between openings, use the efficiency calculated by the rules given in UG-53.
- E1 = 1 when an opening is in the plate or when the opening passes through a circumferential joint in a shell or cone (exclusive of head-to-shell joints); or
- E1 = the joint efficiency obtained from Table UW-12 when any part of the opening passes through any other welded joint.

TR	= minimum required thickness of seamless shell plates, exclusive of corrosion allowance (see UG-25), inches	T	= nominal thickness of the vessel wall, less corrosion allowance, inches
TRN	= minimum required thickness of seamless nozzle plates, exclusive of corrosion allowance (see UG-25), inches	TN	= nominal thickness of nozzle wall, less corrosion allowance, inches
F	= a correction factor which compensates for the variation in pressure stresses on different planes with respect to the axis of a vessel. A value of 1.00 shall be used for all configurations except that Fig. UG-37 may be used for integrally reinforced openings in cylindrical shells and cones	A1	= metal in the vessel wall over and above the thickness required to resist pressure and the thickness specified as corrosion allowance, square inches
RO	= the radius in the given plane of the finished opening in its corroded condition, inches	A2	= metal, in that part of a nozzle wall extending outside the vessel wall, over and above the thickness required to resist pressure and the thickness specified as corrosion allowance, square inches
A(REQD)	= the total cross-sectional area of reinforcement required in any given plane for a vessel under internal pressure, square inches	TL	= the limits of reinforcement measured normal to the vessel wall, conforming to the contour of the surface, inches
		H	= inner nozzle projection, inches
		A3	= all metal in the nozzle wall extending inside the vessel wall, square inches
		W1	= length of attachment weld leg, see geometry (Fig. 1, p. 7) for location, inches
		W2	= length of attachment weld leg, see geometry (Fig. 1, p. 7) for location, inches

- A4 = metal in attachment welds (W1 & W2) available for reinforcement, square inches
- AS = total metal available for reinforcement for an opening without reinforcement pads, square inches
- SP = maximum allowable stress value for pad material, pounds per square inch (see applicable table of stress values in Sub-section C)
- TE(INSIDE) = thickness of attached inside reinforcing pad or height of the largest 60-deg right triangle supported by the vessel and nozzle outside diameter projected surfaces and lying completely within the area of integral reinforcement, inches (see Fig. UG-40) (see Operating Hints and Example 3, p. 13)
- DL = the limits of reinforcement measured parallel to the vessel wall on each side of the axis of the opening, inches
- TE(OUTSIDE) = thickness of attached outside reinforcing pad or height of the largest 60-deg right triangle supported by the vessel and nozzle outside diameter projected surfaces, inches (see Fig. UG-40) (See Operating Hints and Example 3, p. 13)
- TL(OUTSIDE) = the limits of reinforcement outside the vessel wall and measured normal to the vessel wall conforming to the contour of the surface, inches
- TL(INSIDE) = the limits of reinforcement inside the vessel wall and measured normal to the vessel wall conforming to the contour of the surface, inches

- A3* = A3 recomputed using new limits, square inches
- DP(OUTSIDE) = diameter of outside reinforcing pad, inches
- DP(INSIDE) = diameter of inside reinforcing pad, inches
- A5(OUTSIDE) = metal in the outside reinforcing pad available for reinforcement, square inches
- A5(INSIDE) = metal in the inside reinforcing pad available for reinforcement, square inches
- W3 = length of attachment weld leg, see geometry (Fig. 1, p. 7) for location, inches
- W4 = length of attachment weld leg, see geometry (Fig. 1, p. 7) for location, inches
- A4* = metal in attachment welds ($W1+W2+W3+W4$) available for reinforcement, square inches
- A2* = A2 recomputed considering reinforcing pad, square inches
- A(SUM) = total metal available for reinforcement for an opening using reinforcement pads, square inches

ORIGINAL PAGE IS
OF POOR QUALITY

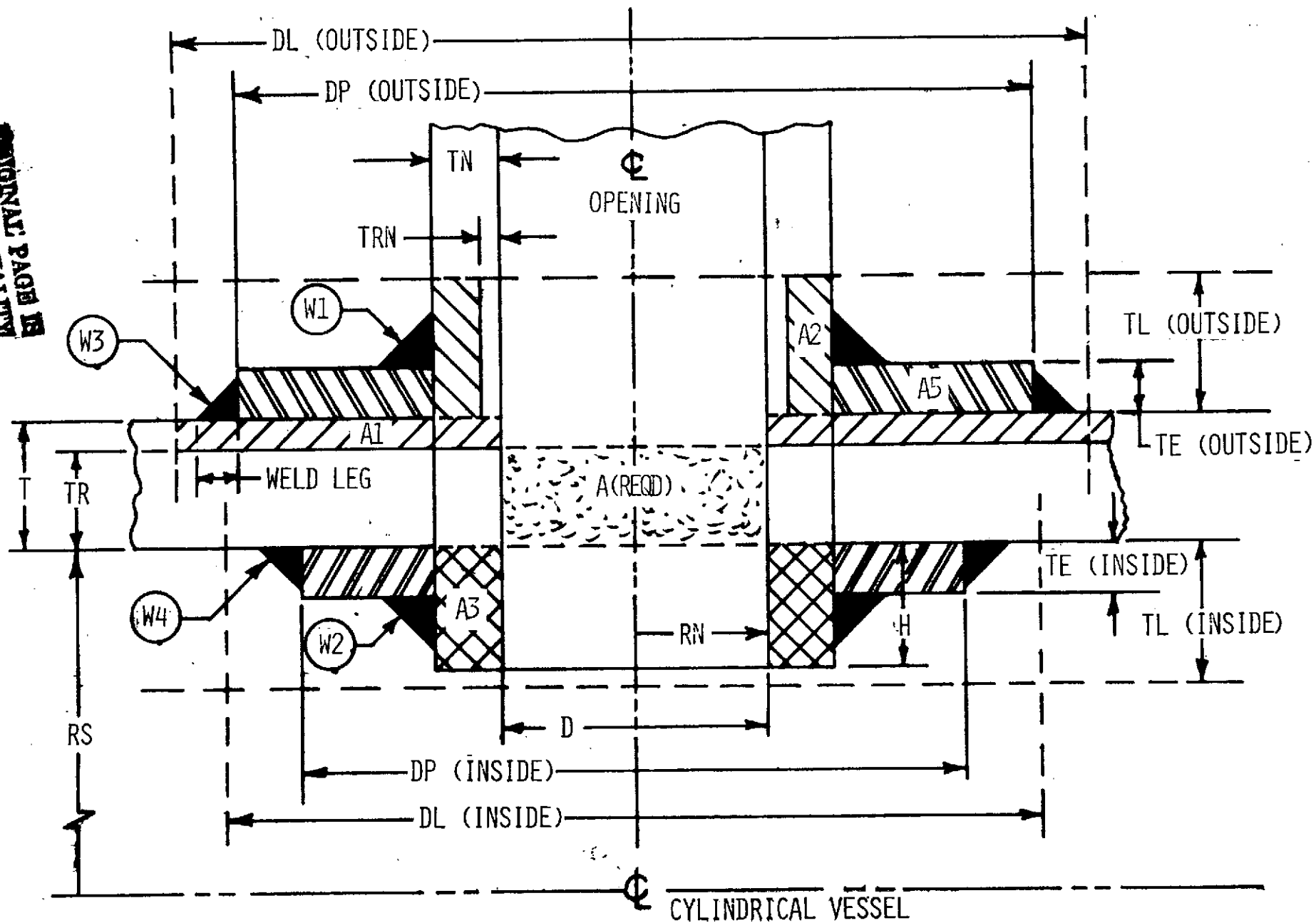
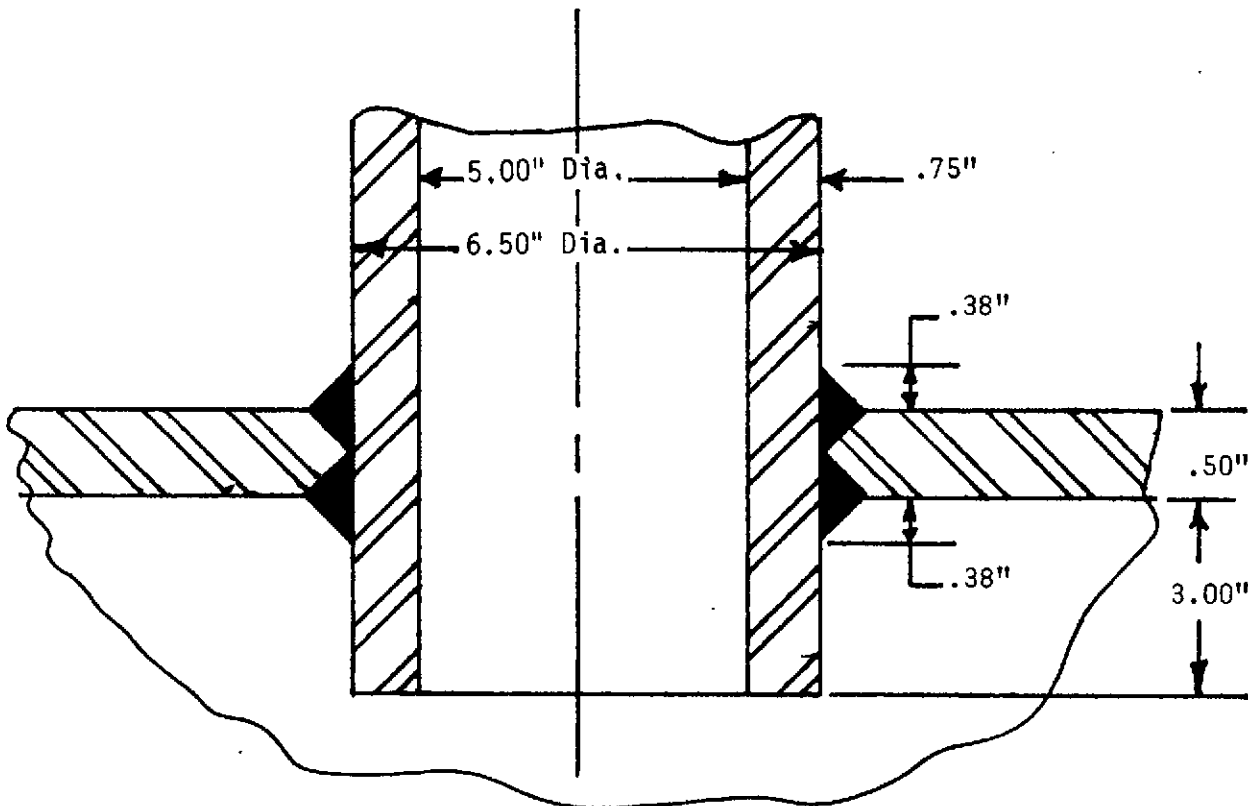


FIG. 1 - GEOMETRY OF REINFORCED OPENING

(See Reference 1 for Allowable Weld Details)

EXAMPLE 1

A 5 in. I.D., 3/4 in. wall, nozzle conforming to Specification SA-181, Grade I, is attached by welding to a vessel that has an inside diameter of 40 in. and a shell thickness of 1/2 in. The nozzle projects into the vessel 3 in. The vessel material conforms to Specification SA-285, Grade C. The vessel is designed for a pressure of 250 lbs. per sq. in. and 150°F. There is no allowance for corrosion. There will be no radiographic examination of welds. The opening passes through a circumferential joint in the shell. Check the opening for reinforcement requirements.



P = 250 lbs. per sq. in.
 RS = 20 in.
 RN = 2.5 in.
 SS = 13,700 lbs. per sq. in.
 SN = 15,000 lbs. per sq. in.
 ES = 0.70
 E1 = 1.0
 F = 1.0
 RO = 2.5 in.
 T = 0.500 in.
 TN = 0.75 in.
 H = 3.0 in.
 W1 = 0.375 in.
 W2 = 0.0 in.

EXAMPLE 1 PRINTOUT

REINFORCEMENTS
FOR
CYLINDRICAL
PRESSURE SHELL
PENETRATIONS
ASME CODE
SECT. VIII DIV 1

NOTES
INPUT DIMENSIONS
IN THE CORRODED
CONDITION

PROGRAM LIMITED
TO INTERNAL
PRESSURE

PRESSURE (PSIG) =
250.0000*
SHELL RAD. (IN) =
20.0000*
NOZZLE RAD. (IN) =
2.5000*
ALLOWABLE SHELL
STRESS (PSI) =
13700.0000*
ALLOWABLE NOZZLE
STRESS (PSI) =
15000.0000*
JOINT EFFICIENCY
OF SHELL E_s =
0.7000*
JOINT EFFICIENCY
 E_1 (SEE UG-40) =
1.0000
REQD SEAMLESS
SHELL THICKNESS =
0.3690
REQD SEAMLESS
NOZZLE THICK. =
0.0421
CORRECTION
FACTOR, F
(SEE UG-37) =
1.0000*
RAD. OF OPENING
IN GIVEN PLANE
IN INCHES =
2.5000*

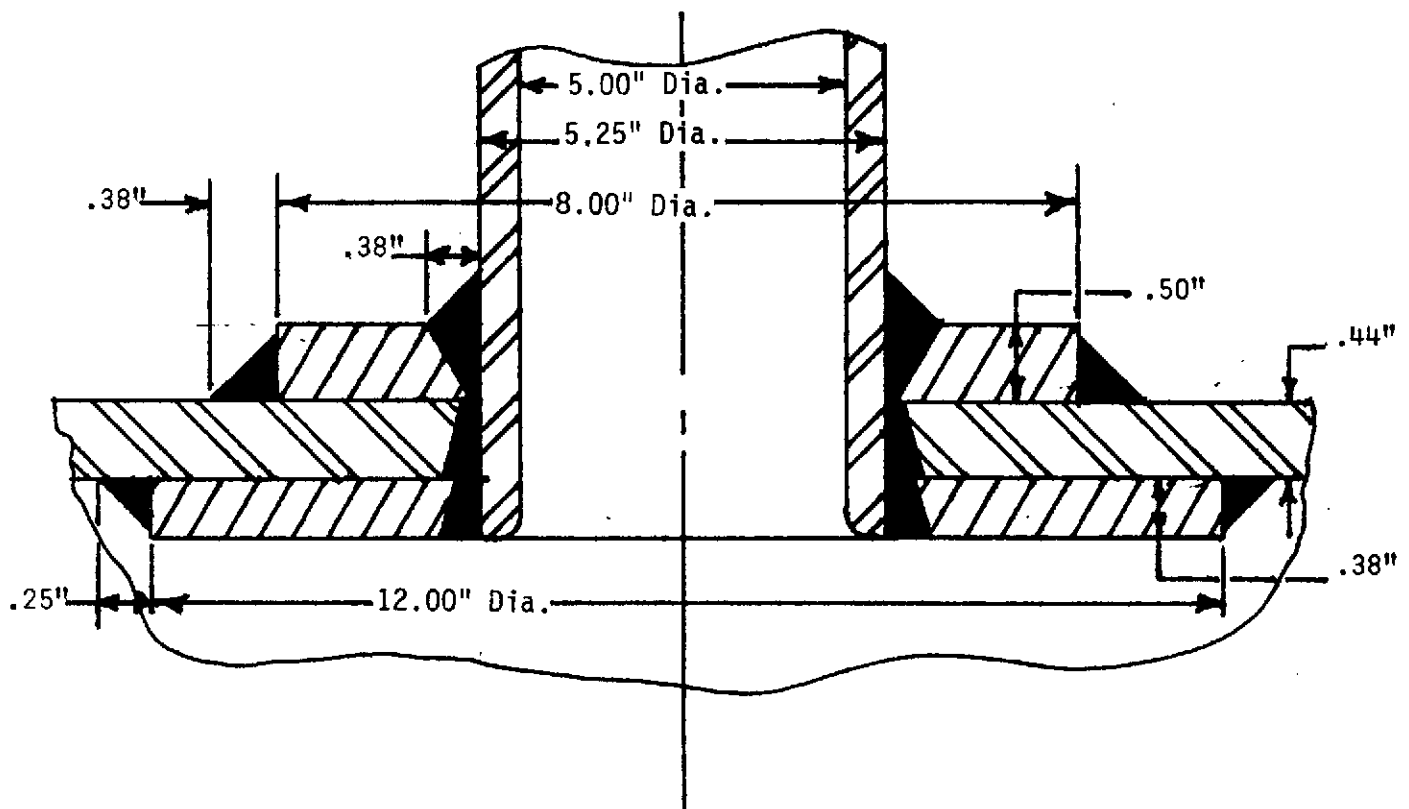
REINFORCEMENT
AREA REQUIRED
 $A(\text{REQD}) =$
2.3127

NOMINAL SHELL
WALL (IN) =
0.5000*
NOMINAL NOZZLE
WALL (IN) =
0.7500*
SHELL WALL AVAIL
FOR REINFORCEMENT
 $A_1 =$
0.6550
NOZ. WALL AVAIL
FOR REINFORCEMENT
 $A_2 =$
1.7698
REINFORCEMENT
LIMITS NORMAL TO
VESSEL WALL
 $TL =$
1.2500
INNER PROJECTION
 $H =$
3.0000*
 H GREATER TL
 $SET H = TL =$
1.2500
INNER PROJECTION
AVAILABLE FOR
REINFORCEMENT
 $A_3 =$
1.8750
LENGTH WELD LEGS
 $W_1 =$
0.3750*
 $W_2 =$
0.3750*
WELD AVAILABLE
FOR REINFORCEMENT
 $A_4 =$
0.2813
REINFORCED AREA
PROVIDED
 $AS (A_1 + A_2 + A_3 + A_4) =$
4.5810
 $A(\text{REQD}) =$
2.3127
SUFFICIENT
REINFORCING

**ORIGINAL PAGE IS
OF POOR QUALITY**

EXAMPLE 2

A 5 in. I.D., 1/8 in. wall nozzle conforming to Specifications SA-181, Grade 1, is attached by welding to a vessel that has an inside diameter of 40 in. and a shell thickness of 7/16 in. The shell material conforms to Specification SA-285, Grade C. Spot examination requirements of UW-52 are to be met. The opening passes through a longitudinal seam of the vessel. The opening is to be reinforced on the outside of the vessel with an 8 in. diameter x 1/2 in. thick reinforcing pad and on the inside by a 12 in. diameter x 3/8 in. thick reinforcing pad. The material for both pads conforms to SA-283, Grade A. The vessel is designed for a pressure of 250 lbs. sq. in. and 400°F. There is no allowance for corrosion. Check the opening for reinforcement requirements.



$P = 250$ lbs. per sq. in.
 $RS = 20$ in.
 $RN = 2.5$ in.
 $SS = 13,700$ lbs. per sq. in.
 $SN = 15,000$ lbs. per sq. in.
 $ES = 0.85$
 $EI = 0.85$
 $F = 1.0$
 $RO = 2.5$ in.
 $T = 0.438$ in.
 $TN = 0.125$ in.
 $H = 0.0$ in.

$W1 = 0.375$ in.
 $W2 = 0.0$ in.
 $SP = 10,300$ lbs. per sq. in.
 $TE(OUTSIDE) = 1/2$ in.
 $TE(INSIDE) = 3/8$ in.
 $DP(OUTSIDE) = 8.0$ in.
 $DP(INSIDE) = 12.0$ in.
 $W1 = 0.375$ in.
 $W2 = 0.0$ in.
 $W3 = 0.375$ in.
 $W4 = 0.250$ in.

EXAMPLE 2 PRINTOUT

REINFORCEMENTS
FOR
CYLINDRICAL
PRESSURE SHELL
PENETRATIONS
ASME CODE
SECT. VIII DIV 1

NOTES
INPUT DIMENSIONS
IN THE CORRODED
CONDITION

PROGRAM LIMITED
TO INTERNAL
PRESSURE

PRESSURE (PSIG)=
250.0000*
SHELL RAD. (IN)=
20.0000*
NOZZLE RAD. (IN)=
2.5000*
ALLOWABLE SHELL
STRESS (PSI)=
13700.0000*
ALLOWABLE NOZZLE
STRESS (PSI)=
15000.0000*
JOINT EFFICIENCY
OF SHELL ES=
0.8500*
JOINT EFFICIENCY
E1 (SEE UG-40)=
0.8500
REQD SEAMLESS
SHELL THICKNESS=
0.3690
REQD SEAMLESS
NOZZLE THICK. =
0.0421
CORRECTION
FACTOR, F
(SEE UG-37) =
1.0000*
RAD. OF OPENING
IN GIVEN PLANE,
IN INCHES=
2.5000*
REINFORCEMENT
AREA REQUIRED
A(REQD)=
1.8450

NOMINAL SHELL
WALL (IN) =
0.4380*
NOMINAL NOZZLE
WALL (IN) =
0.1250*
SHELL WALL AVAIL
FOR REINFORCEMENT
A1 =
0.0165
NOZ. WALL AVAIL
FOR REINFORCEMENT
A2 =
0.0518
REINFORCEMENT
LIMITS NORMAL TO
VESSEL WALL
TL =
0.3125
INNER PROJECTION
H =
0.0000*
INNER PROJECTION
AVAILABLE FOR
REINFORCEMENT
A3 =
0.0000
LENGTH WELD LEGS
W1 =
0.3750*
W2 =
0.0000*
WELD AVAILABLE
FOR REINFORCEMENT
A4 =
0.1406
REINFORCED AREA
PROVIDED
AS (A1+A2+A3+A4) =
0.2089
A (REQD) =
1.8450
REQD REINFORCED
AREA GREATER
THAN AVAILABLE
AREA
ADDITIONAL
REINFORCING
REQD

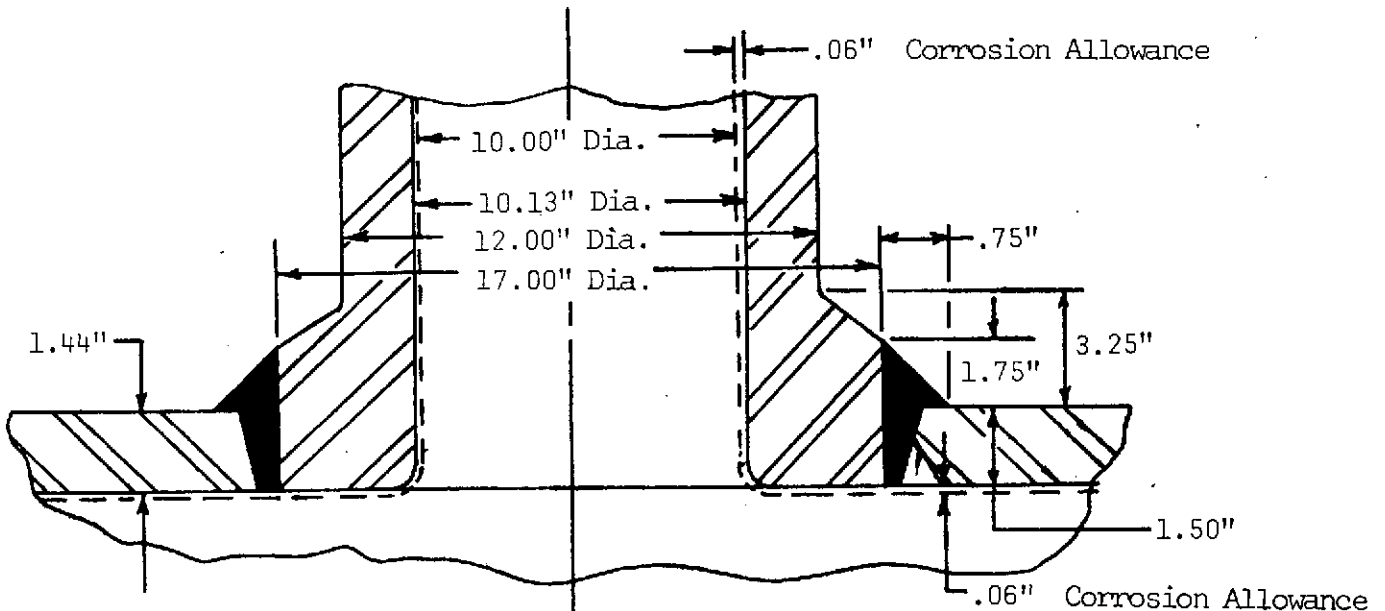
ORIGINAL PAGE IS
OF POOR QUALITY.

EXAMPLE 2 PRINTOUT

ALLOWABLE PAD	WELD LEG LENGTH
STRESS (PSI)=	W1=
10300.0000*	0.3750*
REINFORCING PAD	W2=
THICKNESS	W3=
TE(OUTSIDE)=	0.3750*
0.5000*	W4=
TE(INSIDE)=	0.2500*
0.3750*	W4 OUTSIDE LIMIT
REINFORCEMENT	OF REINFORCEMENT
LIMITS	(NOT CONSIDERED)
PARALLEL TO	WELD AVAILABLE
VESSEL WALL	FOR REINFORCEMENT
DL=	A4*=
10.0000	0.2813
NORMAL TO VESSEL	NOZ. WALL AVAIL
WALL	FOR REINFORCEMENT
TL(OUTSIDE)=	A2*=
0.8125	0.1347
TL(INSIDE)=	A(SUM)=
0.6875	(A1+A2**+A3**+A4**
INNER PROJECTION	A5(OUT)+A5(IN))=
AVAILABLE FOR	2.8054
REINFORCEMENT	A(REQD)=
A3*=	1.8450
0.0000	SUFFICIENT
DIAMETER OF	REINFORCING
REINFORCING PAD	
DP(OUTSIDE)=	
8.0000*	IF REINFORCEMENT
DP(INSIDE)=	IS TOO GREAT
12.0000*	DESIGNER MAY
DP(INSIDE) GTR	OPTIMIZE BY
DL(INSIDE)	VARYING PAD(S)
SET DP=DL=	PARAMETERS
10.0000	
A5(OUTSIDE)=	
1.0338	
A5(INSIDE)=	TO EXERCISE OPTN
1.3392	PRESS (CONT)

EXAMPLE 3

A 10 in. I.D. weld neck, 1 in. wall, conforming to Specification SA-181, Grade I, is attached by welding to a vessel that has an inside diameter of 50 in. and a shell thickness of 1-1/2 in. The shell material conforms to Specification SA-285, Grade C. The vessel is to be designed for 500 lbs. per sq. in. and 800°F. An allowance of 1/16 in. for corrosion is to be included in the shell and nozzle thickness. Main seams in the vessel are to be radiographed. The opening does not pass through a main seam. Check the opening for reinforcement requirements.



$P = 500$ lbs. per sq. in.
 $RS = 25.062$ in.
 $RN = 5.062$ in.
 $SS = 10,200$ lbs. per sq. in.
 $SN = 10,800$ lbs. per sq. in.
 $ES = 1.0$
 $EI = 1.0$
 $F = 1.0$
 $RO = 5.062$ in.
 $T = 1.50 - .062 = 1.438$ in.
 $TN = 1.00 - .062 = 0.938$ in.

$H = 0.0$ in.
 $W1 = 0.75$ in.
 $SP = 10,800$ lbs. per sq. in.
 $TE(OUTSIDE) = 2.500$ in. (see Note 1)
 $TE(INSIDE) = 0.0$ in.
 $DP(OUTSIDE) = 17.0$ in.
 $DP(INSIDE) = 0.0$ in.
 $W1 = 0.0$ in.
 $W2 = 0.0$ in.
 $W3 = 0.75$ in.
 $W4 = 0.0$ in.

Note 1

$$\text{TAN } \theta = [(17.00 - 12.00) \cdot 5] / 3.25 = 0.769$$

$$\theta = 37.57^\circ$$

Since $37.57^\circ > 30^\circ$ [ref UG-40(d)]

$$TE = 3.25 \text{ in.}$$

This value ($TE=3.25$) is used in calculating $A2$. However, the average height of the reinforcing element ($TE=(3.25+1.75) \cdot 5 = 2.500$) is used in calculating $A5$. Since the program uses TE for both calculations, it is suggested that the average value be used. This results in slightly conservative answers for $A2$.

EXAMPLE 3 PRINTOUT

REINFORCEMENTS
FOR
CYLINDRICAL
PRESSURE SHELL
PENETRATIONS
ASME CODE
SECT. VIII DIV 1

NOTES
INPUT DIMENSIONS
IN THE CORRODED
CONDITION

PROGRAM LIMITED
TO INTERNAL
PRESSURE

PRESSURE (PSIG)=
500.0000*
SHELL RAD. (IN)=
25.0620*
NOZZLE RAD. (IN)=
5.0620*
ALLOWABLE SHELL
STRESS (PSI)=
10200.0000*
ALLOWABLE NOZZLE
STRESS (PSI)=
10800.0000*
JOINT EFFICIENCY
OF SHELL E_s =
1.0000*
JOINT EFFICIENCY
 E_1 (SEE UG-40)=
1.0000
REQD SEAMLESS
SHELL THICKNESS=
1.2658
REQD SEAMLESS
NOZZLE THICK.=
0.2410
CORRECTION
FACTOR, F
(SEE UG-37) =
1.0000*
RAD. OF OPENING
IN GIVEN PLANE
IN INCHES=
5.0620*

REINFORCEMENT
AREA REQUIRED
 $A(\text{REQD})$ =
12.8145

NOMINAL SHELL
WALL (IN)=
1.4380*
NOMINAL NOZZLE
WALL (IN)=
0.9380*
SHELL WALL AVAIL
FOR REINFORCEMENT
 A_1 =
1.7438
NOZ. WALL AVAIL
FOR REINFORCEMENT
 A_2 =
3.2687
REINFORCEMENT
LIMITS NORMAL TO
VESSEL WALL
 T_L =
2.3450
INNER PROJECTION
 H =
0.0000*
INNER PROJECTION
AVAILABLE FOR
REINFORCEMENT
 A_3 =
0.0000
LENGTH WELD LEGS
 W_1 =
0.7500*
 W_2 =
0.0000*
WELD AVAILABLE
FOR REINFORCEMENT
 A_4 =
0.5625

REINFORCED AREA
PROVIDED
 $A_S(A_1+A_2+A_3+A_4)$ =
5.5750
 $A(\text{REQD})$ =
12.8145
REQD REINFORCED
AREA GREATER
THAN AVAILABLE
AREA

ADDITIONAL
REINFORCING
REQD

ORIGINAL PAGE IS
OF POOR QUALITY

EXAMPLE 3 PRINTOUT

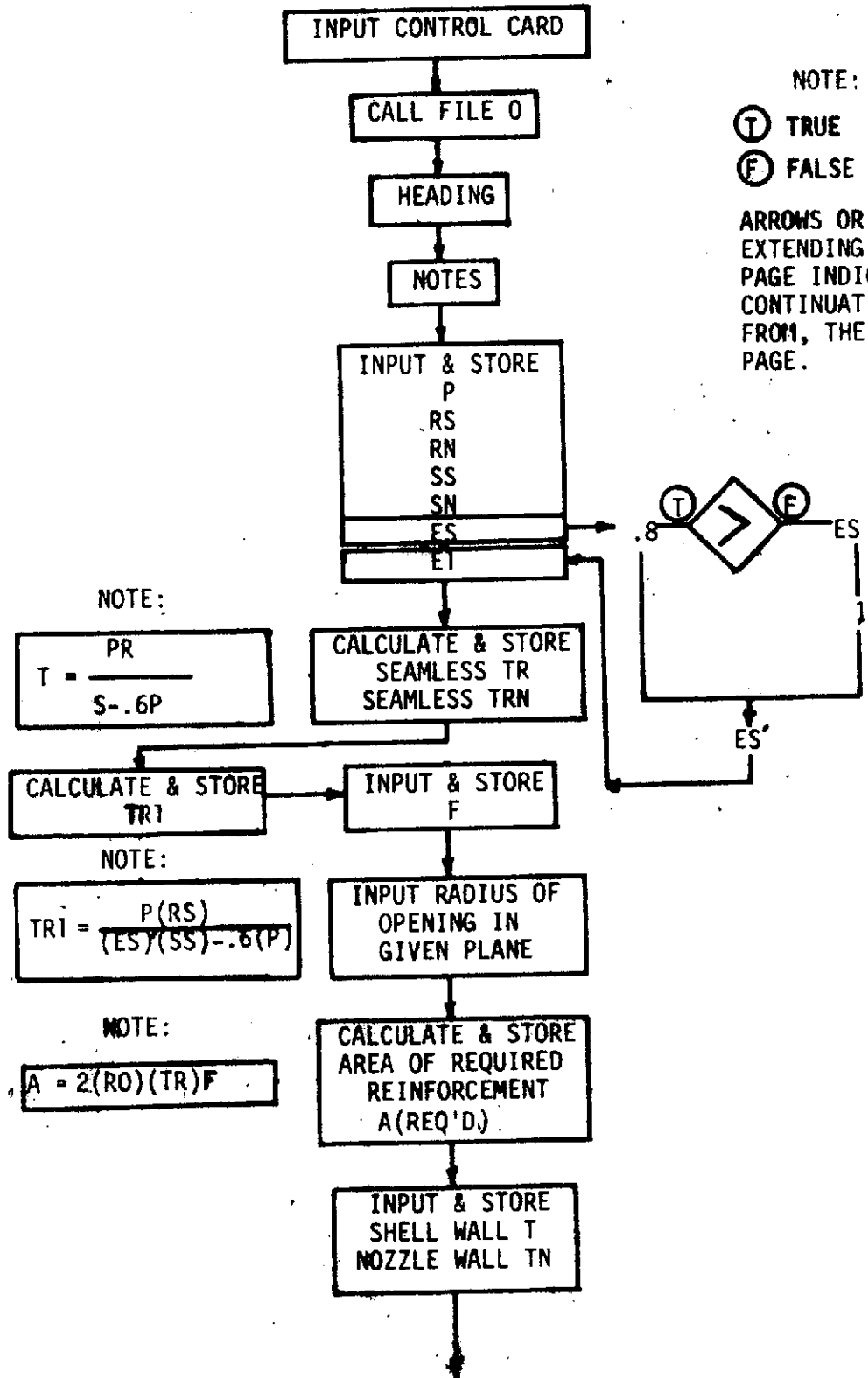
ALLOWABLE PAD	WELD LEG LENGTH
STRESS (PSI)=	W1=
10000.0000*	0.0000*
REINFORCING PAD	W2=
THICKNESS	0.0000*
TE(OUTSIDE)=	W3=
2.5000*	0.7500*
TE(INSIDE)=	W4=
0.0000*	0.0000*
REINFORCEMENT	WELD AVAILABLE
LIMITS	FOR REINFORCEMENT
PARALLEL TO	A4**=
VESSEL WALL :	0.5625
DL=	NOZ. WALL AVAIL
20.2480	FOR REINFORCEMENT
NORMAL TO VESSEL	A2**=
WALL	5.0111
TL(OUTSIDE)=	A(SUM)=
3.5950	(A1+A2**+A3**+A4**
TL(INSIDE)=	A5(OUT)+A5(IN))=
2.3450	19.8174
INNER PROJECTION	A(REQD)=
AVAILABLE FOR	12.8145
REINFORCEMENT	SUFFICIENT
A3**=	REINFORCING
0.0000	
DIAMETER OF	IF REINFORCEMENT
REINFORCING PAD	IS TOO GREAT
DP(OUTSIDE)=	DESIGNER MAY
17.0000*	OPTIMIZE BY
DP(INSIDE)=	VARYING PAD(S)
0.0000*	PARAMETERS
A5(OUTSIDE)=	
12.5000	
A5(INSIDE)=	TO EXERCISE OPTN
0.0000	PRESS (CONT)

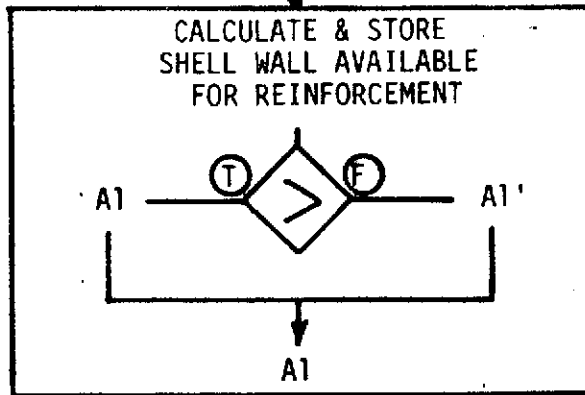
ORIGINAL PAGE IS
OF POOR QUALITY

REINFORCEMENT FOR PRESSURE SHELL PENETRATION PROGRAM
STORAGE LOCATIONS

<u>REGISTER</u>	<u>VARIABLE</u>	<u>REGISTER</u>	<u>VARIABLE</u>
a	Not Used	23	W1
b	Not Used	24	W2
00	P	25	W3
01	RS	26	W4
02	RN	27	A4 or A4*
03	SS	28	AS(SUM)
04	SN	29	Not Used
05	ES'	30	TE(INSIDE)
06	TR using ES'	31	Not Used
07	TR1 (E1=1)	32	Not Used
08	TRN (E=1)	33	RATIO
09	D	34	Not Used
10	F	35	TL(INSIDE)
11	A(REQ'D)	36	Not Used
12	T	37	DP(OUTSIDE)
13	TN	38	DP(INSIDE)
14	TE(OUTSIDE)	39	A5(OUTSIDE)
15	DL	40	A5(INSIDE)
16	TL(OUTSIDE)	41	(TN-TRN)(T)(5)
17	E1	42	(TN-TRN)
18	temporary	43	(TN-TRN)(2.5 TN+TE(O))(2)
19	A1	44	(TN-TRN)(2.5 TN+TE(I))(2)
20	A2	45	A2 from comparison
21	H	46	Not Used
22	A3 or A3*		

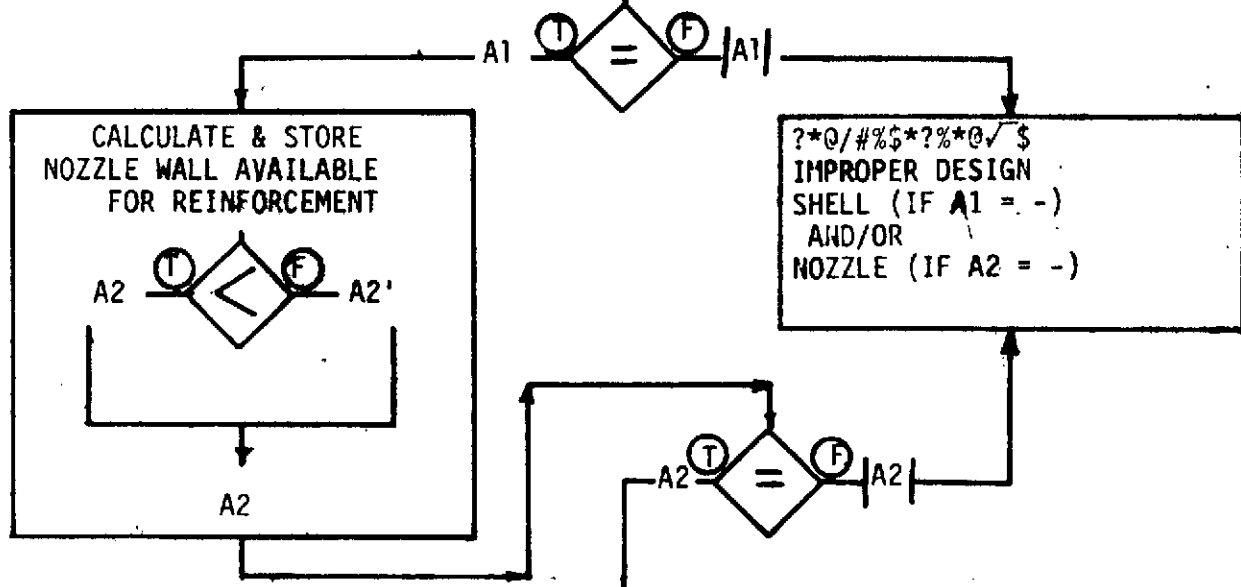
FLOW DIAGRAM
 AN AUTOMATED PROGRAM FOR REINFORCEMENT REQUIREMENTS
 FOR OPENINGS FOR CYLINDRICAL PRESSURE VESSELS





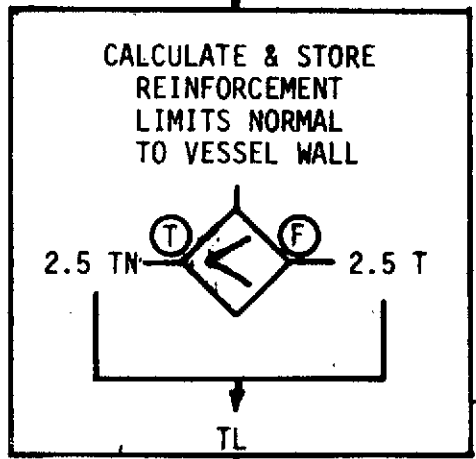
NOTE:

$$A1' = [E1(T) - F(TR)] [2(R0)]$$

$$A1 = 2(E1(T) - F(TR))(T + TN)$$


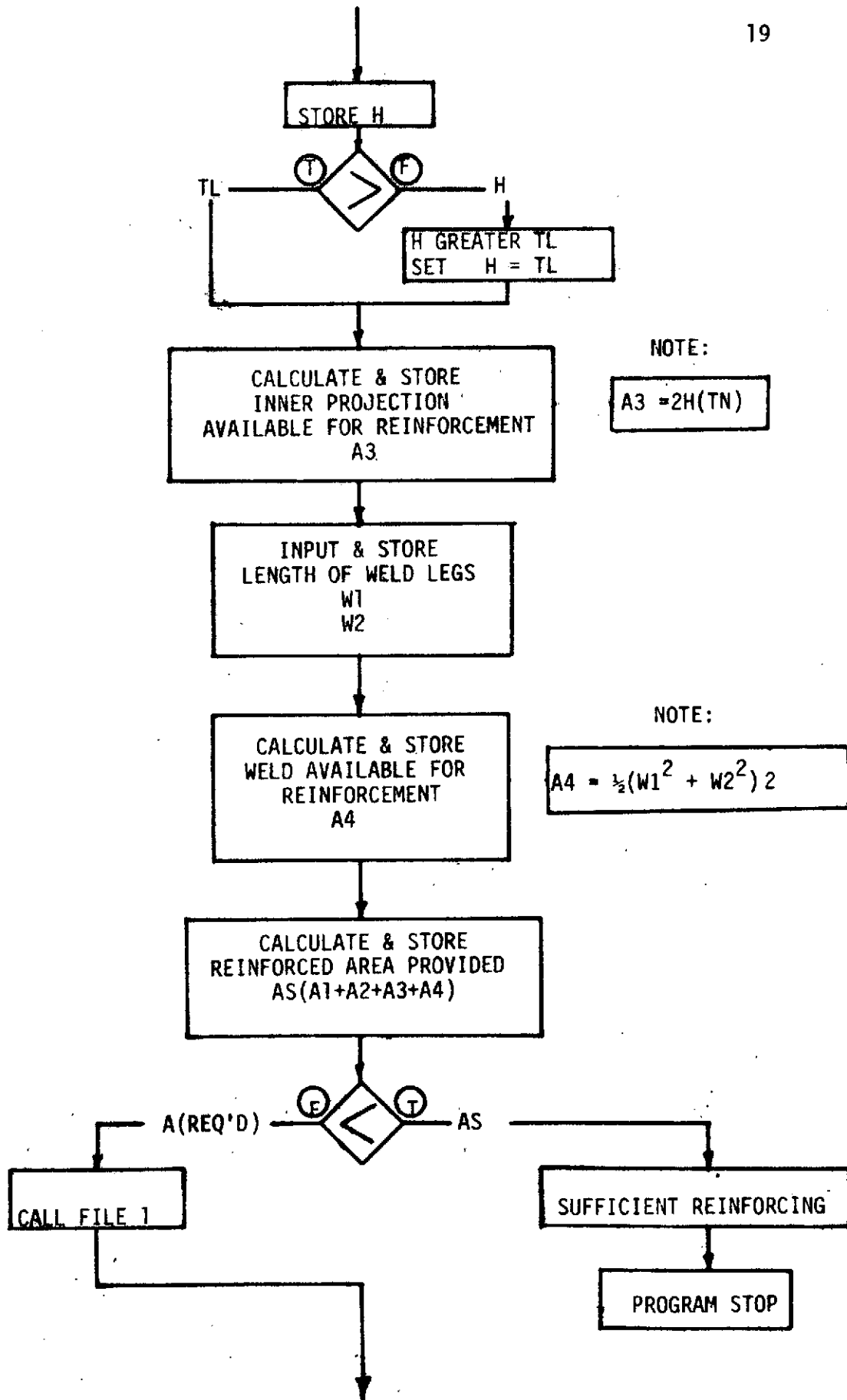
NOTE:

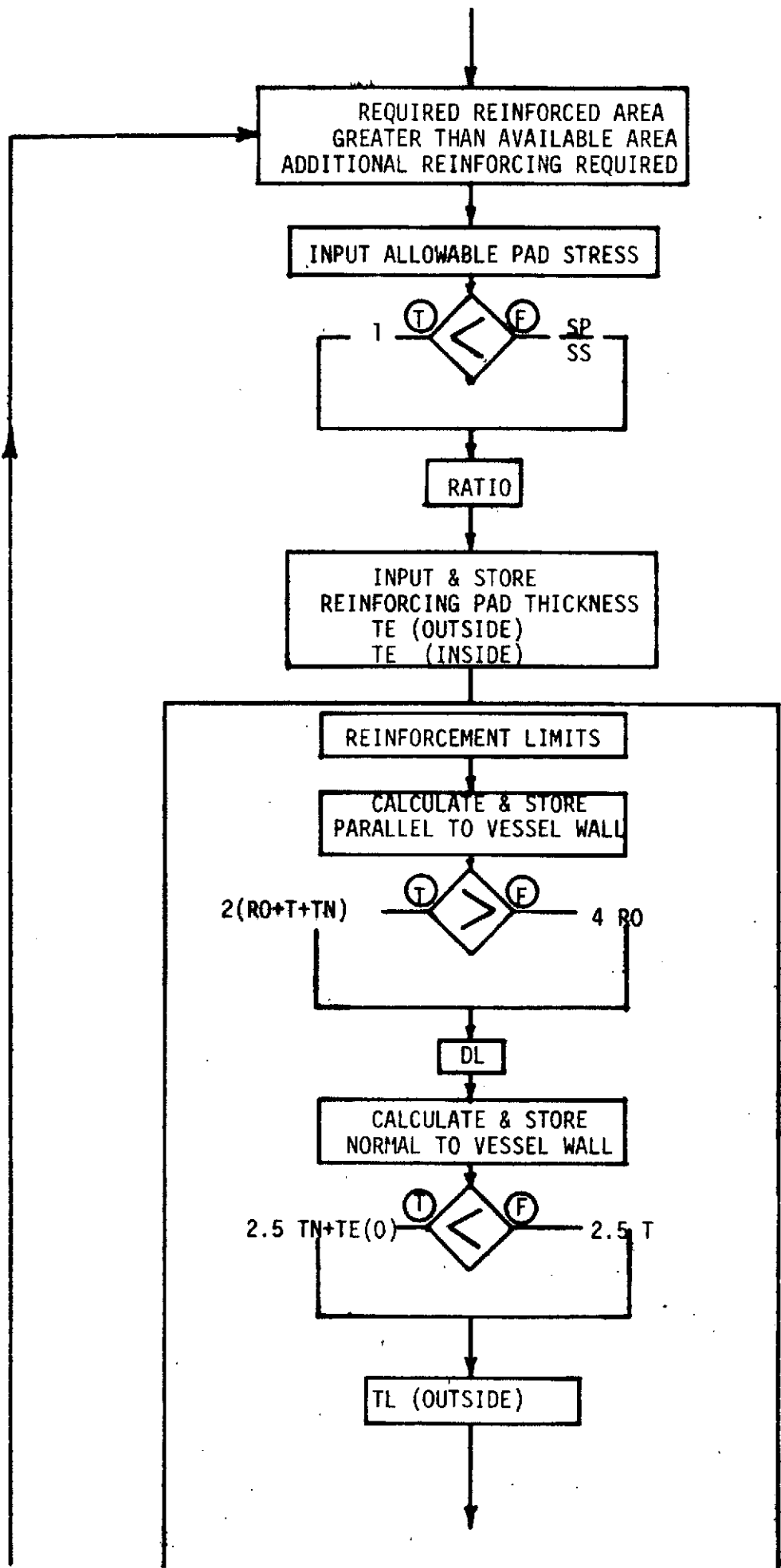
$$A2' = (TN - TRN) 5T$$

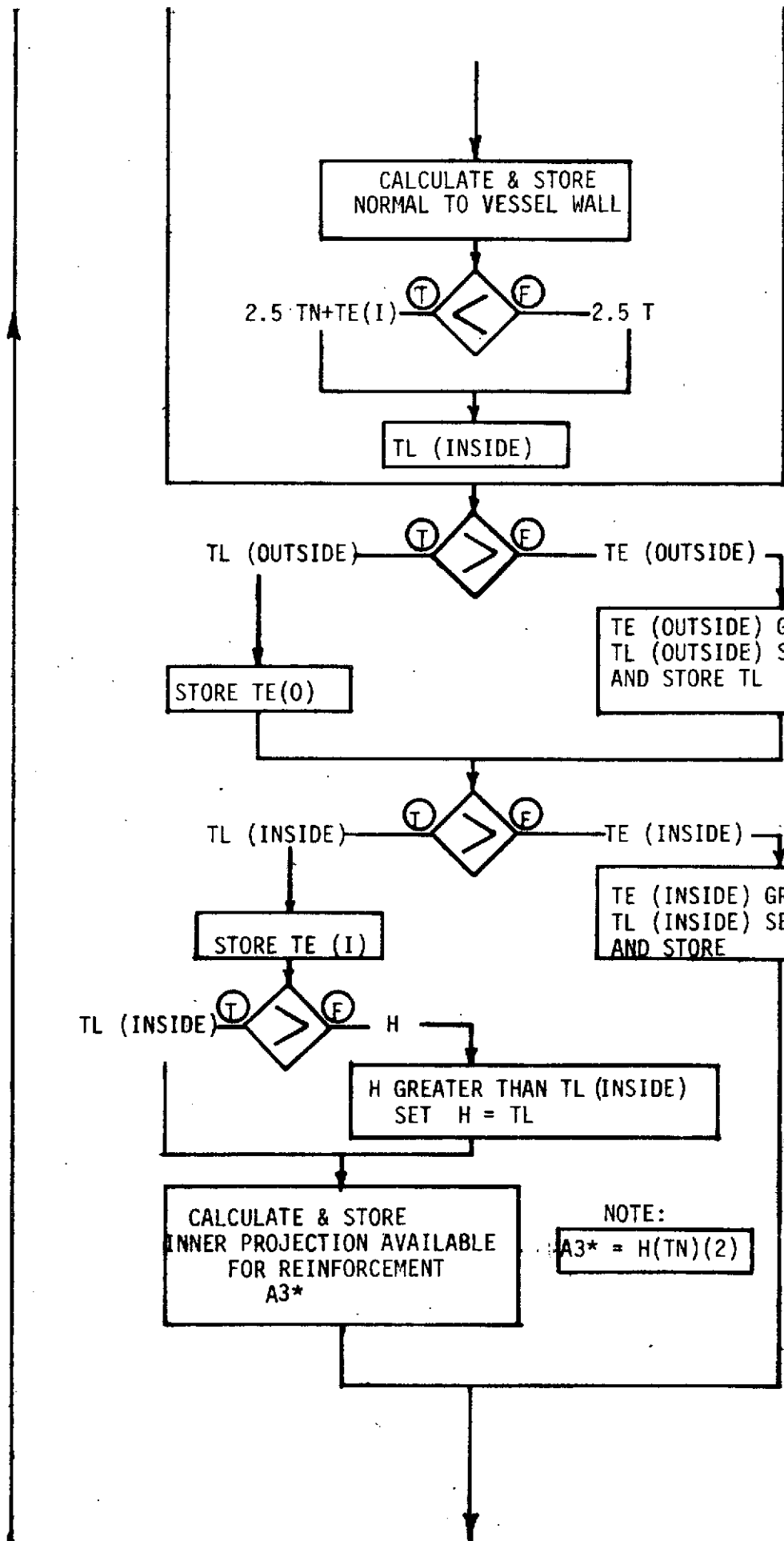
$$A2 = (TN - TRN) (5TN + 2TE)$$


INPUT INNER PROJECTION



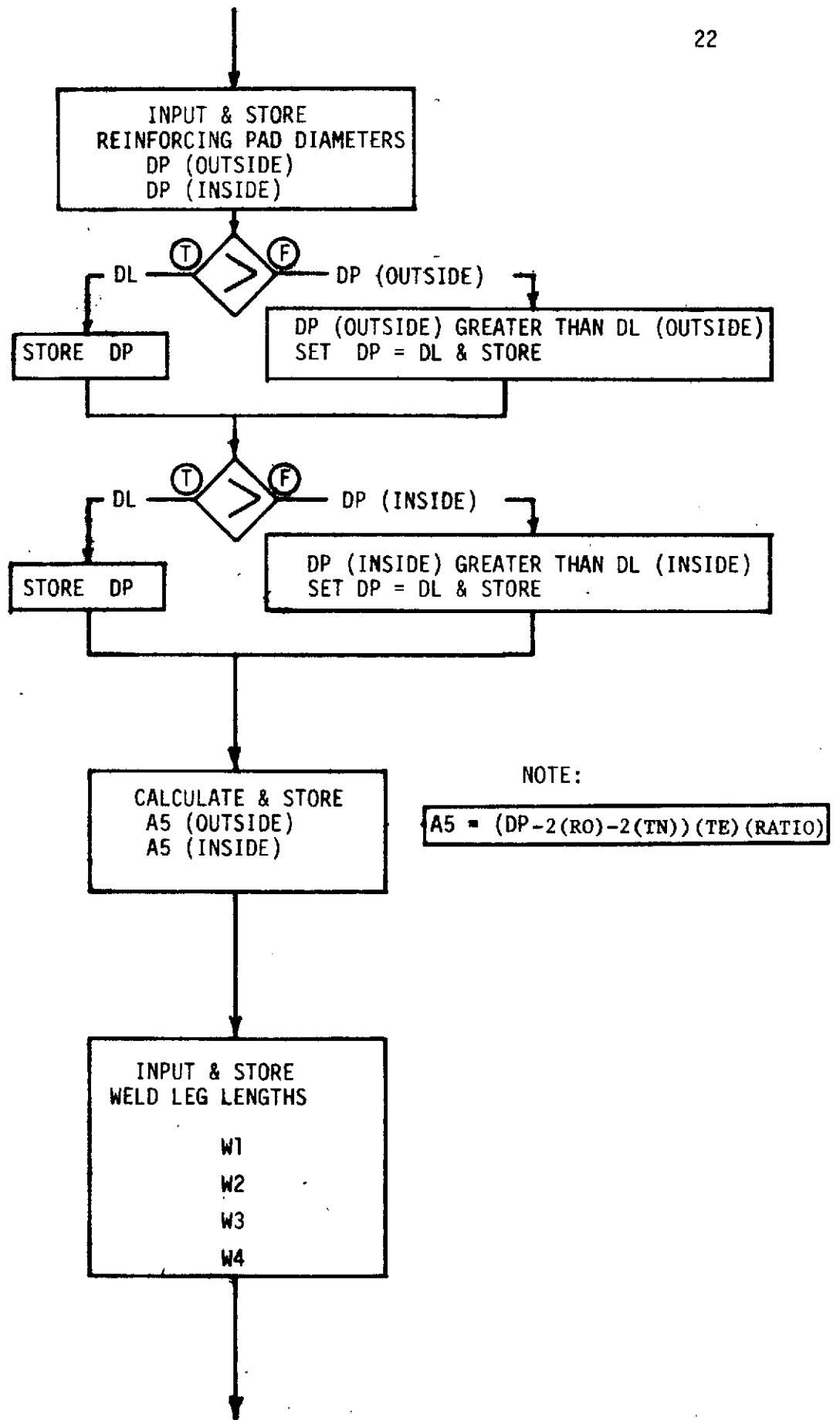


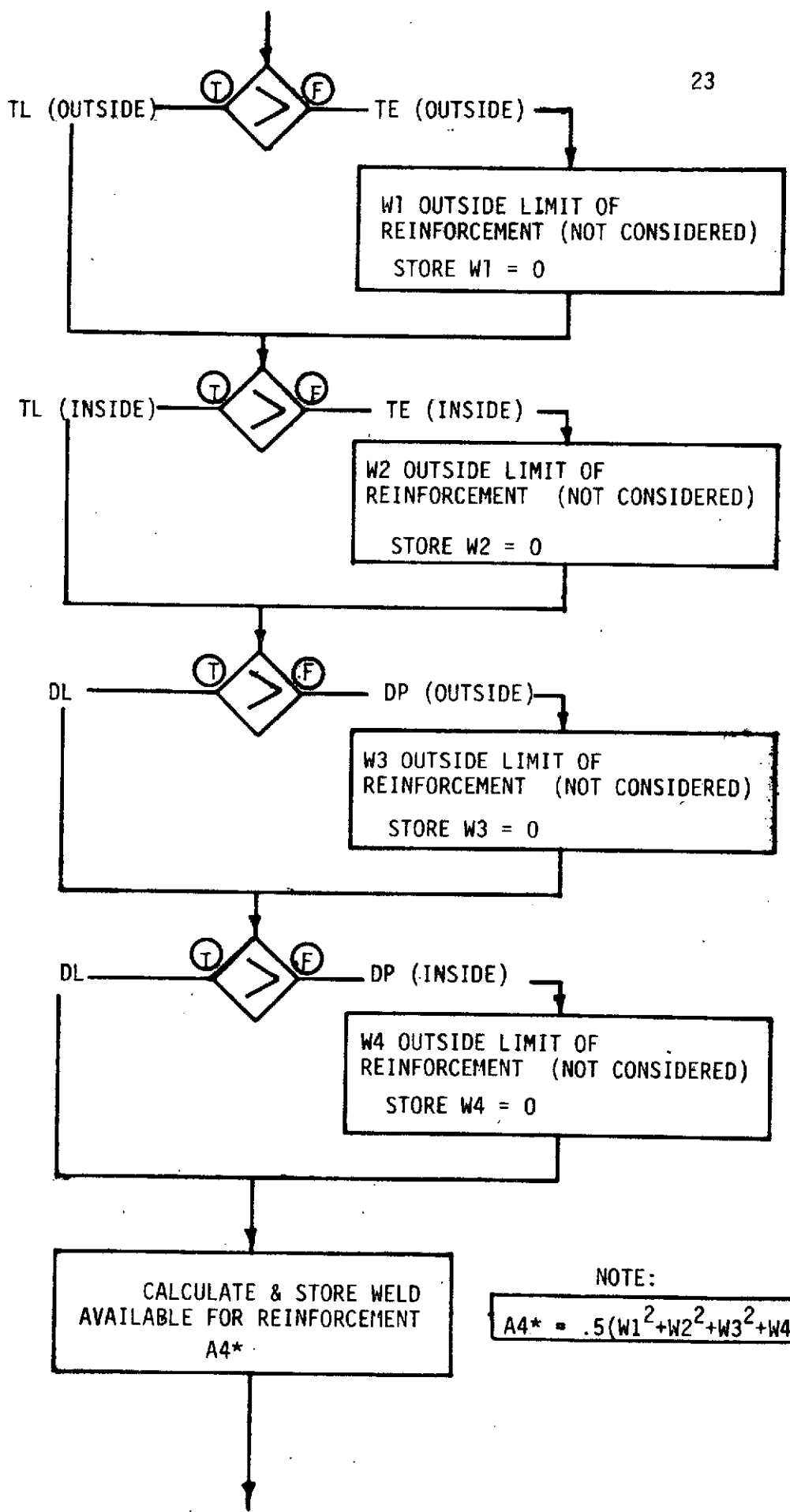


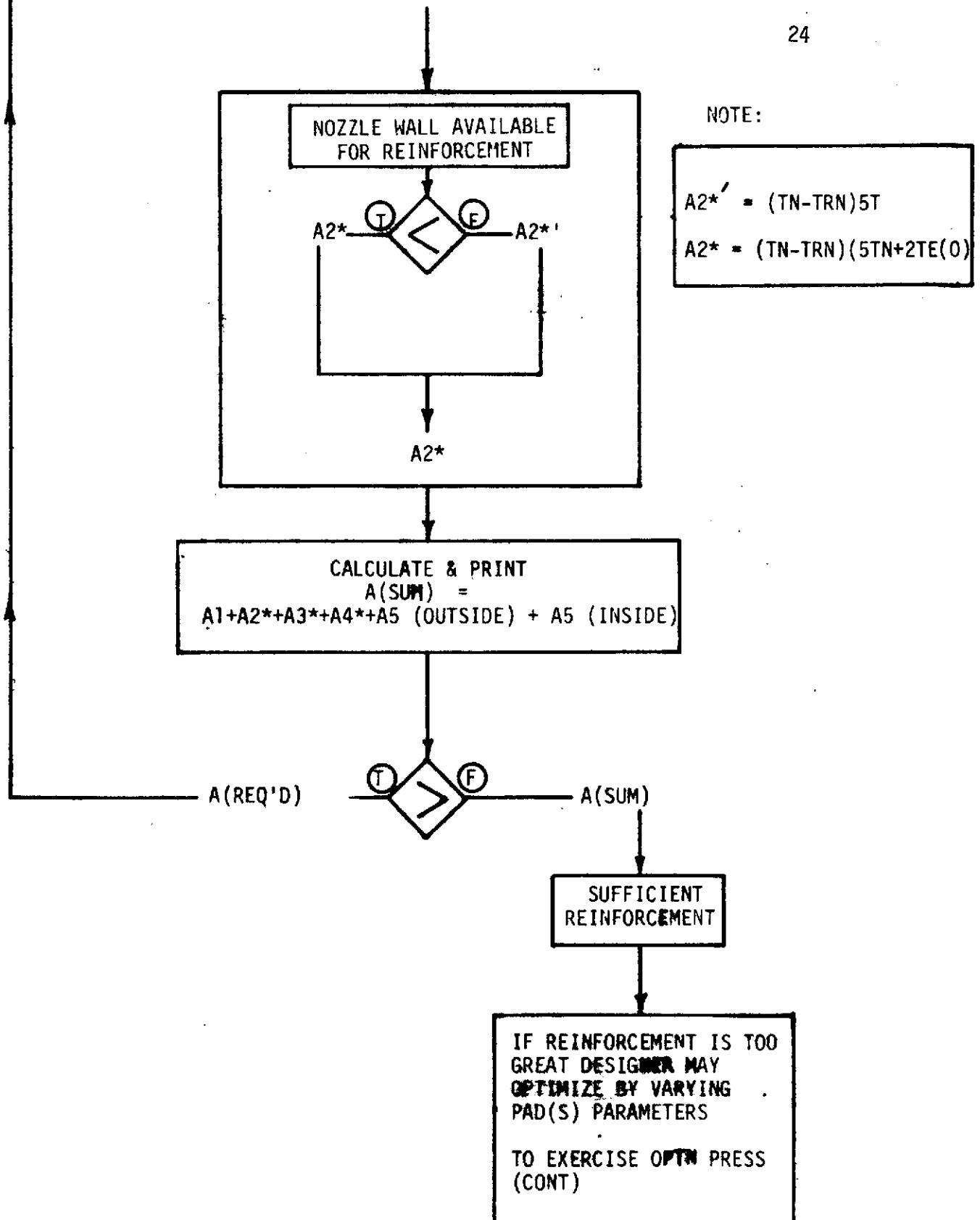


CALCULATE & STORE
INNER PROJECTION AVAILABLE
FOR REINFORCEMENT
A3*

NOTE:
A3* = H(TN)(2)







CONTROL CARD

0000--CLR---20
 0001-- 0 ---00
 0002--FMT---42
 0003-- 5 ---05
 0004--CLX---37
 0005-- 2 ---02
 0006-- 0 ---00
 0007--FMT---42
 0008-- 5 ---05
 0009--S/R---77
 0010--GTO---44
 0011-- 2 ---02
 0012-- 0 ---00
 0013--LBL---51
 0014--SFL---54
 0015-- 2 ---02
 0016-- 0 ---00
 0017--FMT---42
 0018-- 5 ---05
 0019--S/R---77

0020--FMT---42
 0021--FMT---42
 0022--PNT---45
 0023-- a ---13
 0024-- E ---60
 0025-- I ---65
 0026-- N ---73
 0027-- F ---16
 0028-- 0 ---71
 0029-- a ---13
 0030-- C ---61
 0031-- E ---60
 0032-- M ---70
 0033-- E ---60
 0034-- N ---73
 0035--XTO---23
 0036--YTO---40
 0037--PNT---45
 0038--CNT---47
 0039--CNT---47
 0040--CNT---47
 0041--CNT---47
 0042--CNT---47
 0043--CNT---47
 0044-- F ---16
 0045-- 0 ---71
 0046-- a ---13
 0047--CLR---20
 0048--CNT---47
 0049--CNT---47
 0050--CNT---47
 0051-- C ---61
 0052--XFR---67
 0053-- L ---72
 0054-- I ---65
 0055-- N ---73
 0056-- D ---63
 0057-- a ---13
 0058-- I ---65
 0059-- C ---61
 0060-- A ---62
 0061-- L ---72
 0062--CLR---20
 0063--CNT---47
 0064-- a ---56
 0065-- a ---13
 0066-- E ---60
 0067--YTO---40
 0068--YTO---40
 0069--1/X---17
 0070-- a ---13
 0071-- E ---60
 0072--CNT---47
 0073--YTO---40
 0074-- H ---74
 0075-- E ---60
 0076-- L ---72
 0077-- L ---72
 0078--CNT---47
 0079--PNT---45

0080--PNT---45
 0081-- a ---56
 0082-- E ---60
 0083-- N ---73
 0084-- E ---60
 0085--XTO---23
 0086-- a ---13
 0087-- A ---62
 0088--XTO---23
 0089-- I ---65
 0090-- 0 ---71
 0091-- N ---73
 0092--YTO---40
 0093--PNT---45
 0094--PNT---45
 0095--PNT---45
 0096--PNT---45
 0097--PNT---45
 0098-- A ---62
 0099--YTO---40
 0100-- M ---70
 0101-- E ---60
 0102--PNT---45
 0103-- C ---61
 0104-- 0 ---71
 0105-- D ---63
 0106-- E ---60
 0107--CLR---20
 0108--YTO---40
 0109-- E ---60
 0110-- C ---61
 0111--XTO---23
 0112-- . ---21
 0113--PNT---45
 0114--INT---64
 0115-- 1 ---01
 0116-- 1 ---01
 0117-- 1 ---01
 0118--PNT---45
 0119-- D ---63
 0120-- I ---65
 0121--INT---64
 0122--PNT---45
 0123-- 1 ---01
 0124--CLR---20
 0125--CLR---20
 0126--CNT---47
 0127--CNT---47
 0128--CNT---47
 0129--CNT---47
 0130--CNT---47
 0131--CNT---47
 0132-- N ---73
 0133-- 0 ---71
 0134--XTO---23
 0135-- E ---60
 0136--YTO---40
 0137--CNT---47
 0138--CLR---20
 0139-- I ---65

ORIGINAL PAGE IS
 OF POOR QUALITY

0140-- N ---73	0200--CNT---47	0260--SFL---54
0141-- π ---56	0201-- I ---65	0261--FMT---42
0142--1/X---17	0202-- N ---73	0262--STP---41
0143--XTO---23	0203--XTO---23	0263--PMT---45
0144--CNT---47	0204-- E ---60	0264--XTO---23
0145-- D ---63	0205-- a ---13	0265-- 0 ---00
0146-- I ---65	0206-- N ---73	0266-- 0 ---00
0147-- M ---70	0207-- A ---62	0267-- 1 ---01
0148-- E ---60	0208-- L ---72	0268--FMT---42
0149-- N ---73	0209--CLR---20	0269--FMT---42
0150--YTO---40	0210-- π ---56	0270-- N ---73
0151-- I ---65	0211-- a ---13	0271-- 0 ---71
0152-- 0 ---71	0212-- E ---60	0272--XSO---12
0153-- N ---73	0213--YTO---40	0273--XSO---12
0154--YTO---40	0214--YTO---40	0274-- L ---72
0155-- I ---65	0215--1/X---17	0275-- E ---60
0156-- N ---73	0216-- a ---13	0276--CNT---47
0157--CNT---47	0217-- E ---60	0277-- a ---13
0158--XTO---23	0218--CLR---20	0278-- A ---62
0159-- H ---74	0219--CLR---20	0279-- D ---63
0160-- E ---60	0220--CLR---20	0280-- . ---21
0161--CNT---47	0221-- π ---56	0281--X<Y---52
0162-- C ---61	0222-- a ---13	0282-- I ---65
0163-- 0 ---71	0223-- E ---60	0283-- N ---73
0164-- a ---13	0224--YTO---40	0284--PSE---57
0165-- a ---13	0225--YTO---40	0285--SFL---54
0166-- 0 ---71	0226--1/X---17	0286--FMT---42
0167-- D ---63	0227-- a ---13	0287--STP---41
0168-- E ---60	0228-- E ---60	0288--PMT---45
0169-- D ---63	0229--X<Y---52	0289--XTO---23
0170--CNT---47	0230-- π ---56	0290-- 0 ---00
0171-- C ---61	0231-- YTO---40	0291-- 0 ---00
0172-- 0 ---71	0232-- I ---65	0292-- 2 ---02
0173-- N ---73	0233-- G ---15	0293--FMT---42
0174-- D ---63	0234--PSE---57	0294--FMT---42
0175-- I ---65	0235--SFL---54	0295-- A ---62
0176--XTO---23	0236--FMT---42	0296-- L ---72
0177-- I ---65	0237--STP---41	0297-- L ---72
0178-- 0 ---71	0238--PMT---45	0298-- 0 ---71
0179-- N ---73	0239--XTO---23	0299--IND---31
0180--CLR---20	0240-- 0 ---00	0300-- A ---62
0181--CLR---20	0241-- 0 ---00	0301-- B ---66
0182-- π ---56	0242-- 0 ---00	0302-- L ---72
0183-- a ---13	0243--FMT---42	0303-- E ---60
0184-- 0 ---71	0244--FMT---42	0304--CNT---47
0185-- G ---15	0245--YTO---40	0305--YTO---40
0186-- a ---13	0246-- H ---74	0306-- H ---74
0187-- A ---62	0247-- E ---60	0307-- E ---60
0188-- M ---70	0248-- L ---72	0308-- L ---72
0189--CNT---47	0249-- L ---72	0309-- L ---72
0190-- L ---72	0250--CNT---47	0310--CNT---47
0191-- I ---65	0251-- a ---13	0311--YTO---40
0192-- M ---70	0252-- A ---62	0312--XTO---23
0193-- I ---65	0253-- D ---63	0313-- a ---13
0194--XTO---23	0254-- . ---21	0314-- E ---60
0195-- E ---60	0255--CNT---47	0315--YTO---40
0196-- D ---63	0256--X<Y---52	0316--YTO---40
0197--CNT---47	0257-- I ---65	0317--X<Y---52
0198--XTO---23	0258-- N ---73	0318-- π ---56
0199-- 0 ---71	0259--PSE---57	0319--YTO---40

0320-- I ---65
 0321--PSE---57
 0322--SFL---54
 0323--FMT---42
 0324--STP---41
 0325--PNT---45
 0326--XTO---23
 0327-- 0 ---00
 0328-- 0 ---00
 0329-- 3 ---03
 0330--FMT---42
 0331--FMT---42
 0332-- R ---62
 0333-- L ---72
 0334-- L ---72
 0335-- G ---71
 0336--IND---31
 0337-- R ---62
 0338-- B ---66
 0339-- L ---72
 0340-- E ---60
 0341--CNT---47
 0342-- N ---73
 0343-- 0 ---71
 0344--XSO---12
 0345--XSO---12
 0346-- L ---72
 0347-- E ---60
 0348--YTO---40
 0349--XTO---23
 0350-- a ---13
 0351-- E ---60
 0352--YTO---40
 0353--YTO---40
 0354--X<Y---52
 0355-- # ---56
 0356--YTO---40
 0357-- I ---65
 0358--PSE---57
 0359--SFL---54
 0360--FMT---42
 0361--STP---41
 0362--PNT---45
 0363--XTO---23
 0364-- 0 ---00
 0365-- 0 ---00
 0366-- 4 ---04
 0367--FMT---42
 0368--FMT---42
 0369-- J ---75
 0370-- 0 ---71
 0371-- I ---65
 0372-- N ---73
 0373--XTO---23
 0374--CNT---47
 0375-- E ---60
 0376-- F ---16
 0377-- F ---16
 0378-- I ---65
 0379-- C ---61

ORIGINAL PAGE IS
 OF POOR QUALITY

0380-- I ---65
 0381-- E ---60
 0382-- N ---73
 0383-- C ---61
 0384--XFR---67
 0385-- 0 ---71
 0386-- F ---16
 0387--CNT---47
 0388--YTO---40
 0389-- H ---74
 0390-- E ---60
 0391-- L ---72
 0392-- L ---72
 0393--CNT---47
 0394-- E ---60
 0395--YTO---40
 0396--SFL---54
 0397--FMT---42
 0398--STP---41
 0399--PNT---45
 0400-- UP---27
 0401-- . ---21
 0402-- 8 ---10
 0403--X>Y---53
 0404--CTO---44
 0405--LBL---51
 0406--XSO---12
 0407--CNT---47
 0408-- 1 ---01
 0409--LBL---51
 0410--XSO---12
 0411--XTO---23
 0412-- 0 ---00
 0413-- 0 ---00
 0414-- 5 ---05
 0415--FMT---42
 0416--FMT---42
 0417-- J ---75
 0418-- 0 ---71
 0419-- I ---65
 0420-- N ---73
 0421--XTO---23
 0422--CNT---47
 0423-- E ---60
 0424-- F ---16
 0425-- F ---16
 0426-- I ---65
 0427-- C ---61
 0428-- I ---65
 0429-- E ---60
 0430-- N ---73
 0431-- C ---61
 0432--XFR---67
 0433-- E ---60
 0434-- 1 ---01
 0435--CNT---47
 0436--X<Y---52
 0437--YTO---40
 0438-- E ---60
 0439-- E ---60

0440--CNT---47
 0441--I/X---17
 0442-- G ---15
 0443-- - ---34
 0444-- 4 ---04
 0445-- 0 ---00
 0446--PSE---57
 0447--SFL---54
 0448--CNT---47
 0449--FMT---42
 0450--STP---41
 0451--CNT---47
 0452--PNT---45
 0453--XTO---23
 0454-- 0 ---00
 0455-- 1 ---01
 0456-- 7 ---07
 0457--XFR---67
 0458-- 0 ---00
 0459-- 0 ---00
 0460-- 0 ---00
 0461--XFR---67
 0462-- X ---36
 0463-- 0 ---00
 0464-- 0 ---00
 0465-- 1 ---01
 0466-- UP---27
 0467--XFR---67
 0468-- 0 ---00
 0469-- 6 ---00
 0470-- 3 ---03
 0471--CNT---47
 0472--CNT---47
 0473--CNT---47
 0474--CNT---47
 0475--CNT---47
 0476-- UP---27
 0477-- . ---21
 0478-- 6 ---06
 0479--XFR---67
 0480-- X ---36
 0481-- 0 ---00
 0482-- 0 ---00
 0483-- 0 ---00
 0484-- - ---34
 0485-- DN---25
 0486--DIV---35
 0487--XEY---30
 0488--FMT---42
 0489--FMT---42
 0490-- a ---13
 0491-- E ---60
 0492-- b ---14
 0493-- D ---63
 0494--CNT---47
 0495--YTO---40
 0496-- E ---60
 0497-- R ---62
 0498-- M ---70
 0499-- L ---72

0500-- E ---60	0560-- 0 ---00	0620-- H ---74
0501--YTO---40	0561-- 0 ---00	0621-- I ---65
0502--YTO---40	0562-- 6 ---06	0622-- C ---61
0503--CNT---47	0563--XFR---67	0623-- K ---55
0504--CNT---47	0564-- 0 ---00	0624-- . ---21
0505--CNT---47	0565-- 0 ---00	0625--SFL---54
0506--YTO---40	0566-- 0 ---00	0626--FMT---42
0507-- H ---74	0567--XFR---67	0627--PMT---45
0508-- E ---60	0568-- X ---36	0628--XTO---23
0509-- L ---72	0569-- 0 ---00	0629-- 0 ---00
0510-- L ---72	0570-- 0 ---00	0630-- 0 ---00
0511--CNT---47	0571-- 2 ---02	0631-- 8 ---10
0512--XTO---23	0572-- UP---27	0632--XFR---67
0513-- H ---74	0573--XFR---67	0633-- 0 ---00
0514-- I ---65	0574-- 0 ---00	0634-- 0 ---00
0515-- C ---61	0575-- 0 ---00	0635-- 2 ---02
0516-- K ---55	0576-- 4 ---04	0636-- UP---27
0517-- N ---73	0577--CNT---47	0637-- 2 ---02
0518-- E ---60	0578--CNT---47	0638-- X ---36
0519--YTO---40	0579--CNT---47	0639--YTO---40
0520--YTO---40	0580--CNT---47	0640-- 0 ---00
0521--SFL---54	0581--CNT---47	0641-- 0 ---00
0522--FMT---42	0582-- UP---27	0642-- 9 ---11
0523--PMT---45	0583-- . ---21	0643--FMT---42
0524--XTO---23	0584-- 6 ---06	0644--FMT---42
0525-- 0 ---00	0585--XFR---67	0645-- C ---61
0526-- 0 ---00	0586-- X ---36	0646-- 0 ---71
0527-- 7 ---07	0587-- 0 ---00	0647-- a ---13
0528--XFR---67	0588-- 0 ---00	0648-- a ---13
0529-- 0 ---00	0589-- 0 ---00	0649-- E ---60
0530-- 0 ---00	0590-- - ---34	0650-- C ---61
0531-- 0 ---00	0591-- DN---25	0651--XTO---23
0532--XFR---67	0592--DIV---35	0652-- I ---65
0533-- X ---36	0593--KEY---30	0653-- 0 ---71
0534-- 0 ---00	0594--FMT---42	0654-- M ---73
0535-- 0 ---00	0595--FMT---42	0655--CNT---47
0536-- 1 ---01	0596-- a ---13	0656--CNT---47
0537-- UP---27	0597-- E ---60	0657--CNT---47
0538--XFR---67	0598-- f ---14	0658--CNT---47
0539-- 0 ---00	0599-- D ---63	0659--CNT---47
0540-- 0 ---00	0600--CNT---47	0660--CNT---47
0541-- 3 ---03	0601--YTO---40	0661-- F ---16
0542--XFR---67	0602-- E ---60	0662-- A ---62
0543-- X ---36	0603-- A ---62	0663-- C ---61
0544-- 0 ---00	0604-- M ---70	0664--XTO---23
0545-- 0 ---00	0605-- L ---72	0665-- 0 ---71
0546-- 5 ---05	0606-- E ---60	0666-- a ---13
0547-- UP---27	0607--YTO---40	0667--CLX---37
0548-- . ---21	0608--YTO---40	0668-- F ---16
0549-- 6 ---06	0609--CNT---47	0669--CLR---20
0550--XFR---67	0610--CNT---47	0670--X<Y---52
0551-- X ---36	0611--CNT---47	0671--YTO---40
0552-- 0 ---00	0612-- N ---73	0672-- E ---60
0553-- 0 ---00	0613-- 0 ---71	0673-- E ---60
0554-- 0 ---00	0614--X90---12	0674--CNT---47
0555-- - ---34	0615--X90---12	0675--1/X---17
0556-- DN---25	0616-- L ---72	0676-- G ---15
0557--DIV---35	0617-- E ---60	0677-- - ---34
0558--KEY---30	0618--CNT---47	0678-- 3 ---03
0559--XTO---23	0619--XTO---23	0679-- 7 ---07

ORIGINAL PAGE IS
OF POOR QUALITY

07399	1	---	01
07388	0	---	00
07377	X	---	06
07366	XFR	---	67
07355	PMT	---	45
07344	STP	---	41
07333	FMT	---	42
07322	SFL	---	54
07311	YTO	---	40
07300	E	---	60
07289	H	---	74
07278	C	---	61
07267	N	---	73
07256	I	---	65
07245	CNT	---	47
07234	N	---	73
07223	I	---	65
07212	CLR	---	20
07201	E	---	60
07190	N	---	73
07179	R	---	62
07168	L	---	72
07157	A	---	56
07146	CNT	---	47
07135	N	---	73
07124	E	---	60
07113	INT	---	54
07102	I	---	65
07091	C	---	16
07080	CNT	---	47
07069	N	---	73
07058	I	---	65
07047	G	---	15
07036	N	---	73
07025	I	---	65
07014	N	---	73
07003	E	---	60
07002	H	---	62
07001	A	---	56
06990	O	---	71
06979	CNT	---	47
06968	F	---	16
06957	O	---	71
06946	CNT	---	47
06935	.	---	21
06924	D	---	63
06913	H	---	62
06902	A	---	13
06891	FMT	---	42
06880	FMT	---	42
06869	0	---	00
06858	I	---	61
06847	0	---	00
06836	XTO	---	23
06825	XTO	---	23
06814	XTO	---	23
06803	XTO	---	23
06792	XTO	---	23
06781	XTO	---	23
06770	XTO	---	23
06759	XTO	---	23
06748	XTO	---	23
06737	XTO	---	23
06726	XTO	---	23
06715	XTO	---	23
06704	XTO	---	23
06693	XTO	---	23
06682	XTO	---	23
06671	XTO	---	23
06660	XTO	---	23
06649	XTO	---	23
06638	XTO	---	23
06627	XTO	---	23
06616	XTO	---	23
06605	XTO	---	23
06594	XTO	---	23
06583	XTO	---	23
06572	XTO	---	23
06561	XTO	---	23
06550	XTO	---	23
06539	XTO	---	23
06528	XTO	---	23
06517	XTO	---	23
06506	XTO	---	23
06495	XTO	---	23
06484	XTO	---	23
06473	XTO	---	23
06462	XTO	---	23
06451	XTO	---	23
06440	XTO	---	23
06429	XTO	---	23
06418	XTO	---	23
06407	XTO	---	23
06396	XTO	---	23
06385	XTO	---	23
06374	XTO	---	23
06363	XTO	---	23
06352	XTO	---	23
06341	XTO	---	23
06330	XTO	---	23
06319	XTO	---	23
06308	XTO	---	23
06297	XTO	---	23
06286	XTO	---	23
06275	XTO	---	23
06264	XTO	---	23
06253	XTO	---	23
06242	XTO	---	23
06231	XTO	---	23
06220	XTO	---	23
06209	XTO	---	23
06198	XTO	---	23
06187	XTO	---	23
06176	XTO	---	23
06165	XTO	---	23
06154	XTO	---	23
06143	XTO	---	23
06132	XTO	---	23
06121	XTO	---	23
06110	XTO	---	23
06099	XTO	---	23
06088	XTO	---	23
06077	XTO	---	23
06066	XTO	---	23
06055	XTO	---	23
06044	XTO	---	23
06033	XTO	---	23
06022	XTO	---	23
06011	XTO	---	23
06000	XTO	---	23

0860	--FMT	---42	0920	-- 2	---02	0980	-- UP	---27
0861	--STP	---41	0921	-- UP	---27	0981	-- G	---15
0862	--PNT	---45	0922	--XFR	---67	0982	--X=Y	---50
0863	--XTO	---23	0923	-- 0	---00	0983	--GTO	---44
0864	-- 0	---00	0924	-- 1	---01	0984	--LBL	---51
0865	-- 1	---01	0925	-- 0	---00	0985	-- r	---76
0866	-- 3	---03	0926	--XFR	---67	0986	--CNT	---47
0867	-- 0	---00	0927	-- X	---36	0987	--LBL	---51
0868	--XTO	---23	0928	-- 0	---00	0988	--GTO	---44
0869	-- 0	---00	0929	-- 0	---00	0989	--FMT	---42
0870	-- 1	---01	0930	-- 7	---07	0990	--FMT	---42
0871	-- 4	---04	0931	-- -	---34	0991	--CLR	---20
0872	-- 0	---00	0932	--KEY	---30	0992	--IFG	---43
0873	--XTO	---23	0933	--XTO	---23	0993	-- X	---36
0874	-- 0	---00	0934	-- 0	---00	0994	--RUP	---22
0875	-- 0	---00	0935	-- 1	---01	0995	--DIV	---35
0876	-- 0	---00	0936	-- 8	---10	0996	--GTO	---44
0877	--FMT	---42	0937	-- UP	---27	0997	--X=Y	---50
0878	--FMT	---42	0938	--XFR	---67	0998	--LBL	---51
0879	--YTO	---40	0939	-- 0	---00	0999	-- X	---36
0880	-- H	---74	0940	-- 0	---00	1000	--IFG	---43
0881	-- E	---60	0941	-- 9	---11	1001	--X=Y	---50
0882	-- L	---72	0942	-- X	---36	1002	-- X	---36
0883	-- L	---72	0943	--XFR	---67	1003	--RUP	---22
0884	--FNT	---45	0944	-- 0	---00	1004	-- r	---76
0885	--IND	---31	0945	-- 1	---01	1005	--LBL	---51
0886	-- A	---62	0946	-- 8	---10	1006	--CLR	---20
0887	-- L	---72	0947	-- UP	---27	1007	-- I	---65
0888	-- L	---72	0948	-- 2	---02	1008	-- M	---70
0889	--PNT	---45	0949	-- X	---36	1009	-- n	---56
0890	-- A	---62	0950	--XFR	---67	1010	-- a	---13
0891	--INT	---64	0951	-- 0	---00	1011	-- 0	---71
0892	-- A	---62	0952	-- 1	---01	1012	-- n	---56
0893	-- I	---65	0953	-- 2	---02	1013	-- E	---60
0894	-- L	---72	0954	--XFR	---67	1014	-- a	---13
0895	-- F	---16	0955	-- +	---33	1015	--CNT	---47
0896	-- 0	---71	0956	-- 0	---00	1016	-- D	---63
0897	-- a	---13	0957	-- 1	---01	1017	-- E	---60
0898	--PNT	---45	0958	-- 3	---03	1018	--YTO	---40
0899	-- a	---13	0959	-- X	---36	1019	-- I	---65
0900	-- E	---60	0960	-- DN	---25	1020	-- G	---15
0901	-- I	---65	0961	--X>Y	---53	1021	-- N	---73
0902	-- N	---73	0962	--GTO	---44	1022	--CNT	---47
0903	-- F	---16	0963	--LBL	---51	1023	--YTO	---40
0904	-- 0	---71	0964	-- A	---62	1024	-- H	---74
0905	-- a	---13	0965	--CNT	---47	1025	-- E	---60
0906	-- C	---61	0966	--KEY	---30	1026	-- L	---72
0907	-- M	---70	0967	--LBL	---51	1027	-- L	---72
0908	-- E	---60	0968	-- A	---62	1028	--CNT	---47
0909	-- N	---73	0969	--FMT	---42	1029	--X<Y	---52
0910	--XTO	---23	0970	--FMT	---42	1030	-- I	---65
0911	--FMT	---42	0971	-- A	---62	1031	-- F	---16
0912	--XFR	---67	0972	-- 1	---01	1032	--CNT	---47
0913	-- 0	---00	0973	--SFL	---54	1033	-- A	---62
0914	-- 1	---01	0974	--FMT	---42	1034	-- 1	---01
0915	-- 7	---07	0975	--PNT	---45	1035	--SFL	---54
0916	--XFR	---67	0976	--XTO	---23	1036	-- -	---34
0917	-- X	---36	0977	-- 0	---00	1037	--PSE	---57
0918	-- 0	---00	0978	-- 1	---01	1038	--CNT	---47
0919	-- 1	---01	0979	-- 9	---11	1039	--CNT	---47

1040---CNT---47
 1041---CNT---47
 1042---CNT---47
 1043---CNT---47
 1044---R---62
 1045---N---73
 1046---D---63
 1047---DIV---35
 1048---O---71
 1049---a---13
 1050---CLR---20
 1051---N---73
 1052---O---71
 1053---XSR---12
 1054---XSR---12
 1055---L---72
 1056---E---60
 1057---CNT---47
 1058---X<Y---52
 1059---I---65
 1060---F---16
 1061---CNT---47
 1062---R---62
 1063---2---02
 1064---SFL---54
 1065---.---04
 1066---PSE---57
 1067---FMT---42
 1068---STP---41
 1069---CNT---47
 1070---CNT---47
 1071---CNT---47
 1072---CNT---47
 1073---CNT---47
 1074---CNT---47
 1075---CNT---47
 1076---CNT---47
 1077---CNT---47
 1078---CNT---47
 1079---LBL---51
 1080---T---76
 1081---FMT---42
 1082---FMT---42
 1083---N---73
 1084---O---71
 1085---XSR---12
 1086---.---21
 1087---PNT---45
 1088---IND---01
 1089---R---62
 1090---L---72
 1091---L---72
 1092---PNT---45
 1093---R---62
 1094---INT---64
 1095---R---62
 1096---I---65
 1097---L---72
 1098---PNT---45
 1099---F---16

ORIGINAL PAGE IS
 OF POOR QUALITY

1100---O---71
 1101---a---13
 1102---PNT---45
 1103---a---13
 1104---E---60
 1105---I---65
 1106---N---73
 1107---F---16
 1108---O---71
 1109---a---13
 1110---C---61
 1111---M---70
 1112---E---60
 1113---N---73
 1114---XTO---23
 1115---FMT---42
 1116---XFR---67
 1117---0---00
 1118---1---01
 1119---3---03
 1120---XFR---67
 1121---.---34
 1122---0---00
 1123---0---00
 1124---8---10
 1125---XTO---23
 1126---0---00
 1127---1---01
 1128---8---10
 1129---UP---27
 1130---5---05
 1131---X---36
 1132---XFR---67
 1133---0---00
 1134---1---01
 1135---2---02
 1136---X---36
 1137---5---05
 1138---XFR---67
 1139---X---36
 1140---0---00
 1141---1---01
 1142---3---03
 1143---UP---27
 1144---2---02
 1145---XFR---67
 1146---X---36
 1147---0---00
 1148---1---01
 1149---4---04
 1150---+---03
 1151---XFR---67
 1152---0---00
 1153---1---01
 1154---0---10
 1155---X---36
 1156---DN---25
 1157---X<Y---52
 1158---GTO---44
 1159---LBL---51

1160---B---66
 1161---CNT---47
 1162---XEY---30
 1163---LBL---51
 1164---B---66
 1165---FMT---42
 1166---FMT---42
 1167---R---62
 1168---2---02
 1169---SFL---54
 1170---FMT---42
 1171---PNT---45
 1172---XTO---23
 1173---0---00
 1174---2---02
 1175---0---00
 1176---UP---27
 1177---G---15
 1178---X=Y---50
 1179---GTO---44
 1180---LBL---51
 1181---X=Y---50
 1182---CNT---47
 1183---GTO---44
 1184---LBL---51
 1185---GTO---44
 1186---CNT---47
 1187---CNT---47
 1188---LBL---51
 1189---X=Y---50
 1190---XFR---67
 1191---0---00
 1192---1---01
 1193---2---02
 1194---UP---27
 1195---2---02
 1196---.---21
 1197---5---05
 1198---X---36
 1199---UP---27
 1200---XFR---67
 1201---0---00
 1202---1---01
 1203---3---03
 1204---X---36
 1205---DN---25
 1206---X<Y---52
 1207---GTO---44
 1208---LBL---51
 1209---C---61
 1210---CNT---47
 1211---XEY---30
 1212---LBL---51
 1213---C---61
 1214---FMT---42
 1215---FMT---42
 1216---a---13
 1217---E---60
 1218---I---65
 1219---N---73

13220	F	16
1221	O	71
1222	O	13
1223	O	61
1224	E	50
1225	M	70
1226	E	60
1227	N	73
1228	X10	23
1229	CNT	47
1230	CNT	47
1231	CNT	47
1232	CNT	47
1233	CNT	47
1234	CNT	47
1235	CNT	47
1236	CNT	47
1237	CNT	47
1238	CNT	47
1239	CNT	47
1240	CNT	47
1241	CNT	47
1242	CNT	47
1243	CNT	47
1244	CNT	47
1245	CNT	47
1246	CNT	47
1247	CNT	47
1248	CNT	47
1249	CNT	47
1250	CNT	47
1251	CNT	47
1252	CNT	47
1253	CNT	47
1254	CNT	47
1255	CNT	47
1256	CNT	47
1257	CNT	47
1258	CNT	47
1259	CNT	47
1260	CNT	47
1261	CNT	47
1262	CNT	47
1263	CNT	47
1264	CNT	47
1265	CNT	47
1266	CNT	47
1267	CNT	47
1268	CNT	47
1269	CNT	47
1270	CNT	47
1271	CNT	47
1272	CNT	47
1273	CNT	47
1274	CNT	47
1275	CNT	47
1276	CNT	47
1277	CNT	47
1278	CNT	47
1279	CNT	47
1280	CNT	47
1281	CNT	47
1282	CNT	47
1283	CNT	47
1284	CNT	47
1285	CNT	47
1286	CNT	47
1287	CNT	47
1288	CNT	47
1289	CNT	47
1290	CNT	47
1291	CNT	47
1292	CNT	47
1293	CNT	47
1294	CNT	47
1295	CNT	47
1296	CNT	47
1297	CNT	47
1298	CNT	47
1299	CNT	47
1300	CNT	47
1301	CNT	47
1302	CNT	47
1303	CNT	47
1304	CNT	47
1305	CNT	47
1306	CNT	47
1307	CNT	47
1308	CNT	47
1309	CNT	47
1310	CNT	47
1311	CNT	47
1312	CNT	47
1313	CNT	47
1314	CNT	47
1315	CNT	47
1316	CNT	47
1317	CNT	47
1318	CNT	47
1319	CNT	47
1320	CNT	47
1321	CNT	47
1322	CNT	47
1323	CNT	47
1324	CNT	47
1325	CNT	47
1326	CNT	47
1327	CNT	47
1328	CNT	47
1329	CNT	47
1330	CNT	47
1331	CNT	47
1332	CNT	47
1333	CNT	47
1334	CNT	47
1335	CNT	47
1336	CNT	47
1337	CNT	47
1338	CNT	47
1339	CNT	47
1340	CNT	47
1341	CNT	47
1342	CNT	47
1343	CNT	47
1344	CNT	47
1345	CNT	47
1346	CNT	47
1347	CNT	47
1348	CNT	47
1349	CNT	47
1350	CNT	47
1351	CNT	47
1352	CNT	47
1353	CNT	47
1354	CNT	47
1355	CNT	47
1356	CNT	47
1357	CNT	47
1358	CNT	47
1359	CNT	47
1360	CNT	47
1361	CNT	47
1362	CNT	47
1363	CNT	47
1364	CNT	47
1365	CNT	47
1366	CNT	47
1367	CNT	47
1368	CNT	47
1369	CNT	47
1370	CNT	47
1371	CNT	47
1372	CNT	47
1373	CNT	47
1374	CNT	47
1375	CNT	47
1376	CNT	47
1377	CNT	47
1378	CNT	47
1379	CNT	47
1380	CNT	47
1381	CNT	47
1382	CNT	47
1383	CNT	47
1384	CNT	47
1385	CNT	47
1386	CNT	47
1387	CNT	47
1388	CNT	47
1389	CNT	47
1390	CNT	47
1391	CNT	47
1392	CNT	47
1393	CNT	47
1394	CNT	47
1395	CNT	47
1396	CNT	47
1397	CNT	47
1398	CNT	47
1399	CNT	47
1400	CNT	47

1580-- 1 ---01
 1581--CNT---47
 1582--FMT---42
 1583--FMT---42
 1584-- A ---62
 1585--X<Y---52
 1586-- a ---13
 1587-- E ---60
 1588-- b ---14
 1589-- D ---63
 1590--PSE---57
 1591--SFL---54
 1592--FMT---42
 1593--PNT---45
 1594--KEY---30
 1595--X>Y---53
 1596--GTO---44
 1597--LBL---51
 1598-- E ---60
 1599--CNT---47
 1600-- 1 ---01
 1601--FMT---42
 1602-- 5 ---05
 1603--CLX---37
 1604--GTO---44
 1605--LBL---51
 1606--SFL---54
 1607--CNT---47
 1608--CNT---47
 1609--CNT---47
 1610--CNT---47
 1611--CNT---47
 1612--CNT---47
 1613--CNT---47
 1614--CNT---47
 1615--LBL---51
 1616-- E ---60
 1617--FMT---42
 1618--FMT---42
 1619--PNT---45
 1620--PNT---45
 1621--PNT---45
 1622--YTO---40
 1623--1/X---17
 1624-- F ---16
 1625-- F ---16
 1626-- I ---65
 1627-- C ---61
 1628-- I ---65
 1629-- E ---60
 1630-- N ---73
 1631--XTO---23
 1632--PNT---45
 1633--PNT---45
 1634--PNT---45
 1635--PNT---45
 1636--PNT---45
 1637-- a ---13
 1638-- E ---60
 1639-- I ---65

1640-- N ---73
 1641-- F ---16
 1642-- O ---71
 1643-- a ---13
 1644-- C ---61
 1645-- I ---65
 1646-- N ---73
 1647-- G ---15
 1648--FMT---42
 1649--STP---41
 1650--END---46

TAPE 1 - FILE 1

0020--LBL---51
 0021--XFR---67
 0022--FMT---42
 0023--FMT---42
 0024-- a ---13
 0025-- E ---60
 0026-- b ---14
 0027-- D ---63
 0028--PNT---45
 0029-- a ---13
 0030-- E ---60
 0031-- I ---65
 0032-- N ---73
 0033-- F ---16
 0034-- O ---71
 0035-- a ---13
 0036-- C ---61
 0037-- E ---60
 0038-- D ---63
 0039--PNT---45
 0040--PNT---45
 0041--PNT---45
 0042-- A ---62
 0043-- a ---13
 0044-- E ---60
 0045-- A ---62
 0046--PNT---45
 0047-- G ---15
 0048-- a ---13
 0049-- E ---60
 0050-- A ---62
 0051--XTO---23
 0052-- E ---60
 0053-- a ---13
 0054--PNT---45
 0055--PNT---45
 0056--PNT---45
 0057--XTO---23
 0058-- H ---74
 0059-- A ---62

0060-- N ---73
 0061--PNT---45
 0062-- A ---62
 0063--INT---64
 0064-- A ---62
 0065-- I ---65
 0066-- L ---72
 0067-- A ---62
 0068-- B ---66
 0069-- L ---72
 0070-- E ---60
 0071--PNT---45
 0072--PNT---45
 0073--PNT---45
 0074--PNT---45
 0075--PNT---45
 0076--PNT---45
 0077--PNT---45
 0078-- A ---62
 0079-- a ---13
 0080-- E ---60
 0081-- A ---62
 0082--CLR---20
 0083--CLR---20
 0084--PNT---45
 0085--PNT---45
 0086--PNT---45
 0087-- A ---62
 0088-- D ---63
 0089-- D ---63
 0090-- I ---65
 0091--XTO---23
 0092-- I ---65
 0093-- O ---71
 0094-- N ---73
 0095-- A ---62
 0096-- L ---72
 0097--CLR---20
 0098--PNT---45
 0099--PNT---45
 0100-- a ---13
 0101-- E ---60
 0102-- I ---65
 0103-- N ---73
 0104-- F ---16
 0105-- O ---71
 0106-- a ---13
 0107-- C ---61
 0108-- I ---65
 0109-- N ---73
 0110-- G ---15
 0111--CLR---20
 0112--PNT---45
 0113--PNT---45
 0114--PNT---45
 0115--PNT---45
 0116--PNT---45
 0117--PNT---45
 0118-- a ---13
 0119-- E ---60

0120-- B ---14
 0121-- D ---63
 0122-- FMT---42
 0123-- CLR---20
 0124-- CLR---20
 0125-- CNT---47
 0126-- GTO---44
 0127-- LBL---51
 0128-- F ---16
 0129-- CNT---47
 0130-- LBL---51
 0131-- F ---16
 0132-- FMT---42
 0133-- FMT---42
 0134-- CLR---20
 0135-- CLR---20
 0136-- CLR---20
 0137-- A ---62
 0138-- L ---72
 0139-- L ---72
 0140-- O ---71
 0141-- IND ---31
 0142-- A ---62
 0143-- B ---66
 0144-- L ---72
 0145-- E ---60
 0146-- CNT---47
 0147-- a ---56
 0148-- A ---62
 0149-- D ---63
 0150-- CNT---47
 0151-- CNT---47
 0152-- CNT---47
 0153-- YTO---40
 0154-- XTO---23
 0155-- a ---13
 0156-- E ---60
 0157-- YTO---40
 0158-- YTO---40
 0159-- CNT---47
 0160-- X<Y---52
 0161-- a ---56
 0162-- YTO---40
 0163-- I ---65
 0164-- PSE---57
 0165-- SFL---54
 0166-- FMT---42
 0167-- STP---41
 0168-- PNT---45
 0169-- UP---27
 0170-- XFR---67
 0171-- 0 ---00
 0172-- 3 ---03
 0173-- DIV---35
 0174-- 1 ---01
 0175-- X<Y---52
 0176-- GTO---44
 0177-- LBL---51
 0178-- G ---15
 0179-- CNT---47

**ORIGINAL PAGE IS
 OF POOR QUALITY**

0180-- XEY---30
 0181-- LBL---51
 0182-- G ---15
 0183-- XTO---23
 0184-- 3 ---03
 0185-- 3 ---03
 0186-- FMT---42
 0187-- FMT---42
 0188-- a ---13
 0189-- E ---60
 0190-- I ---65
 0191-- N ---73
 0192-- F ---16
 0193-- 0 ---71
 0194-- a ---13
 0195-- C ---61
 0196-- I ---65
 0197-- N ---73
 0198-- G ---15
 0199-- CNT---47
 0200-- a ---56
 0201-- A ---62
 0202-- D ---63
 0203-- CNT---47
 0204-- XTO---23
 0205-- H ---74
 0206-- I ---65
 0207-- C ---61
 0208-- K ---55
 0209-- N ---73
 0210-- E ---60
 0211-- YTO---40
 0212-- YTO---40
 0213-- CLR---20
 0214-- XTO---23
 0215-- E ---60
 0216-- X<Y---52
 0217-- 0 ---71
 0218-- 1/X---17
 0219-- XTO---23
 0220-- YTO---40
 0221-- I ---65
 0222-- 0 ---63
 0223-- E ---60
 0224-- PSE---57
 0225-- SFL---54
 0226-- FMT---42
 0227-- STP---41
 0228-- PNT---45
 0229-- XTO---23
 0230-- 0 ---00
 0231-- 1 ---01
 0232-- 4 ---04
 0233-- FMT---42
 0234-- FMT---42
 0235-- XTO---23
 0236-- E ---60
 0237-- X<Y---52
 0238-- I ---65
 0239-- N ---73

0240-- YTO---40
 0241-- I ---65
 0242-- D ---63
 0243-- E ---60
 0244-- PSE---57
 0245-- SFL---54
 0246-- FMT---42
 0247-- STP---41
 0248-- PNT---45
 0249-- XTO---23
 0250-- 0 ---00
 0251-- 3 ---03
 0252-- 0 ---00
 0253-- FMT---42
 0254-- FMT---42
 0255-- CLR---20
 0256-- a ---13
 0257-- E ---60
 0258-- I ---65
 0259-- N ---73
 0260-- F ---16
 0261-- 0 ---71
 0262-- a ---13
 0263-- C ---61
 0264-- E ---60
 0265-- M ---70
 0266-- E ---60
 0267-- N ---73
 0268-- XTO---23
 0269-- CLR---20
 0270-- L ---72
 0271-- I ---65
 0272-- M ---70
 0273-- I ---65
 0274-- XTO---23
 0275-- YTO---40
 0276-- CLR---20
 0277-- CNT---47
 0278-- CNT---47
 0279-- CNT---47
 0280-- CNT---47
 0281-- CNT---47
 0282-- CNT---47
 0283-- CNT---47
 0284-- CNT---47
 0285-- CNT---47
 0286-- CNT---47
 0287-- CNT---47
 0288-- CNT---47
 0289-- CNT---47
 0290-- CNT---47
 0291-- CNT---47
 0292-- CNT---47
 0293-- a ---56
 0294-- A ---62
 0295-- a ---13
 0296-- A ---62
 0297-- L ---72
 0298-- L ---72
 0299-- E ---60

0300-- L ----72	0360-- 0 ----00	0420-- 1/X----17
0301-- CNT---47	0361-- 1 ----01	0421-- XTO---23
0302-- XTO---23	0362-- 5 ----05	0422-- YTO---40
0303-- 0 ----71	0363-- 2 ----02	0423-- I ----65
0304-- CLR---20	0364-- . ----21	0424-- D ----63
0305-- INT---64	0365-- 5 ----05	0425-- E ----60
0306-- E ----60	0366-- UP---27	0426-- PSE---57
0307-- YTO---40	0367-- XFR---67	0427-- SFL---54
0308-- YTO---40	0368-- 0 ----00	0428-- FMT---42
0309-- E ----60	0369-- 1 ----01	0429-- PNT---45
0310-- L ----72	0370-- 2 ----02	0430-- XTO---23
0311-- CNT---47	0371-- X ----36	0431-- 0 ----00
0312-- IND---31	0372-- 2 ----02	0432-- 1 ----01
0313-- A ----62	0373-- . ----21	0433-- 6 ----06
0314-- L ----72	0374-- 5 ----05	0434-- 2 ----02
0315-- L ----72	0375-- XFR---67	0435-- . ----21
0316-- FMT---42	0376-- X ----36	0436-- 5 ----05
0317-- 2 ----02	0377-- 0 ----00	0437-- UP---27
0318-- XFR---67	0378-- 1 ----01	0438-- XFR---67
0319-- X ----36	0379-- 3 ----03	0439-- 0 ----00
0320-- 0 ----00	0380-- XFR---67	0440-- 1 ----01
0321-- 0 ----00	0381-- + ----33	0441-- 2 ----02
0322-- 9 ----11	0382-- 0 ----00	0442-- X ----36
0323-- UP---27	0383-- 1 ----01	0443-- 2 ----02
0324-- XFR---67	0384-- 4 ----04	0444-- . ----21
0325-- 0 ----00	0385-- X<Y---52	0445-- 5 ----05
0326-- 0 ----00	0386-- GTO---44	0446-- XFR---67
0327-- 9 ----11	0387-- LBL---51	0447-- X ----36
0328-- UP---27	0388-- I ----65	0448-- 0 ----00
0329-- 2 ----02	0389-- CNT---47	0449-- 1 ----01
0330-- DIV---35	0390-- XEY---30	0450-- 3 ----03
0331-- XFR---67	0391-- LBL---51	0451-- XFR---67
0332-- 0 ----00	0392-- I ----65	0452-- + ----33
0333-- 1 ----01	0393-- FMT---42	0453-- 0 ----00
0334-- 2 ----02	0394-- FMT---42	0454-- 3 ----03
0335-- + ----33	0395-- N ----73	0455-- 0 ----00
0336-- XFR---67	0396-- 0 ----71	0456-- X<Y---52
0337-- 0 ----00	0397-- a ----13	0457-- GTO---44
0338-- 1 ----01	0398-- H ----70	0458-- LBL---51
0339-- 3 ----03	0399-- A ----62	0459-- J ----75
0340-- + ----33	0400-- L ----72	0460-- CNT---47
0341-- 2 ----02	0401-- CNT---47	0461-- XEY---30
0342-- X ----36	0402-- XTO---23	0462-- LBL---51
0343-- DN---25	0403-- 0 ----71	0463-- J ----75
0344-- X>Y---53	0404-- CNT---47	0464-- FMT---42
0345-- GTO---44	0405-- INT---64	0465-- FMT---42
0346-- LBL---51	0406-- E ----60	0466-- XTO---23
0347-- H ----74	0407-- YTO---40	0467-- L ----72
0348-- CNT---47	0408-- YTO---40	0468-- X<Y---52
0349-- XEY---30	0409-- E ----60	0469-- I ----65
0350-- LBL---51	0410-- L ----72	0470-- N ----73
0351-- H ----74	0411-- IND---31	0471-- YTO---40
0352-- FMT---42	0412-- A ----62	0472-- I ----65
0353-- FMT---42	0413-- L ----72	0473-- D ----63
0354-- D ----63	0414-- L ----72	0474-- E ----60
0355-- L ----72	0415-- CLR---20	0475-- PSE---57
0356-- SFL---54	0416-- XTO---23	0476-- SFL---54
0357-- FMT---42	0417-- L ----72	0477-- FMT---42
0358-- PNT---45	0418-- X<Y---52	0478-- PNT---45
0359-- XTO---23	0419-- 0 ----71	0479-- XTO---23

0480-- 0 ---00
 0481-- 3 ---03
 0482-- 5 ---05
 0483--XFR---67
 0484-- 0 ---00
 0485-- 1 ---01
 0486-- 4 ---04
 0487-- UP---27
 0488--XFR---67
 0489-- 0 ---00
 0490-- 1 ---01
 0491-- 6 ---06
 0492--X>Y---53
 0493--GTO---44
 0494--LBL---51
 0495-- K ---55
 0496--CNT---47
 0497--CNT---47
 0498--FMT---42
 0499--FMT---42
 0500--PNT---45
 0501--PNT---45
 0502--XTO---23
 0503-- E ---60
 0504--X<Y---52
 0505-- 0 ---71
 0506--1/X---17
 0507--XTO---23
 0508--YTO---40
 0509-- I ---65
 0510-- D ---63
 0511-- E ---60
 0512--PSE---57
 0513--PNT---45
 0514--PNT---45
 0515--CLR---20
 0516--PNT---45
 0517--PNT---45
 0518-- G ---15
 0519-- a ---13
 0520-- E ---60
 0521-- R ---62
 0522--XTO---23
 0523-- E ---60
 0524-- a ---13
 0525--PNT---45
 0526--XTO---23
 0527-- H ---74
 0528-- R ---62
 0529-- N ---73
 0530--CLR---20
 0531--PNT---45
 0532--PNT---45
 0533--XTO---23
 0534-- L ---72
 0535--X<Y---52
 0536-- 0 ---71
 0537--1/X---17
 0538--XTO---23
 0539--YTO---40

**ORIGINAL PAGE IS
 OF POOR QUALITY.**

0540-- I ---65
 0541-- D ---63
 0542-- E ---60
 0543--PSE---57
 0544--PNT---45
 0545--PNT---45
 0546--CLR---20
 0547--YTO---40
 0548-- E ---60
 0549--XTO---23
 0550--PNT---45
 0551--XTO---23
 0552-- E ---60
 0553--SFL---54
 0554--XTO---23
 0555-- L ---72
 0556--SFL---54
 0557--FMT---42
 0558--CNT---47
 0559--PNT---45
 0560--XTO---23
 0561-- 0 ---00
 0562-- 1 ---01
 0563-- 4 ---04
 0564--GTO---44
 0565--LBL---51
 0566-- L ---72
 0567--CNT---47
 0568--CNT---47
 0569--LBL---51
 0570-- K ---55
 0571--KEY---30
 0572--XTO---23
 0573-- 0 ---00
 0574-- 1 ---01
 0575-- 4 ---04
 0576--LBL---51
 0577-- L ---72
 0578--XFR---67
 0579-- 0 ---00
 0580-- 3 ---03
 0581-- 0 ---00
 0582-- UP---27
 0583--XFR---67
 0584-- 0 ---00
 0585-- 3 ---03
 0586-- 5 ---05
 0587--X>Y---53
 0588--GTO---44
 0589--LBL---51
 0590-- M ---70
 0591--CNT---47
 0592--FMT---42
 0593--FMT---42
 0594--PNT---45
 0595--PNT---45
 0596--PNT---45
 0597--XTO---23
 0598-- E ---60
 0599--X<Y---52

0600-- I ---65
 0601-- N ---73
 0602--YTO---40
 0603-- I ---65
 0604-- D ---63
 0605-- E ---60
 0606--PSE---57
 0607--CLR---20
 0608--PNT---45
 0609-- G ---15
 0610-- a ---13
 0611-- E ---60
 0612-- R ---62
 0613--XTO---23
 0614-- E ---60
 0615-- a ---13
 0616--PNT---45
 0617--XTO---23
 0618-- H ---74
 0619-- R ---62
 0620-- N ---73
 0621--CLR---20
 0622--PNT---45
 0623--PNT---45
 0624--PNT---45
 0625--XTO---23
 0626-- L ---72
 0627--X<Y---52
 0628-- I ---65
 0629-- N ---73
 0630--YTO---40
 0631-- I ---65
 0632-- D ---63
 0633-- E ---60
 0634--PSE---57
 0635--CLR---20
 0636--YTO---40
 0637-- E ---60
 0638--XTO---23
 0639--PNT---45
 0640--XTO---23
 0641-- E ---60
 0642--SFL---54
 0643--XTO---23
 0644-- L ---72
 0645--SFL---54
 0646--FMT---42
 0647--CNT---47
 0648--PNT---45
 0649--XTO---23
 0650-- 0 ---00
 0651-- 3 ---03
 0652-- 0 ---00
 0653--GTO---44
 0654--LBL---51
 0655-- N ---73
 0656--CNT---47
 0657--LBL---51
 0658-- M ---70
 0659--KEY---30

0660--XTO---23	0720-- I ---65	0780-- D ---63
0661-- 0 ---00	0721-- N ---73	0781-- I ---65
0662-- 3 ---03	0722-- N ---73	0782-- A ---62
0663-- 0 ---00	0723-- E ---60	0783-- M ---70
0664--XFR---67	0724-- a ---13	0784-- E ---60
0665-- 0 ---00	0725--CNT---47	0785--XTO---23
0666-- 2 ---02	0726-- # ---56	0786-- E ---60
0667-- 1 ---01	0727-- a ---13	0787-- a ---13
0668-- UP---27	0728-- 0 ---71	0788--CNT---47
0669--XFR---67	0729-- J ---75	0789-- 0 ---71
0670-- 0 ---00	0730-- E ---60	0790-- F ---16
0671-- 3 ---03	0731-- C ---61	0791--CLR---20
0672-- 5 ---05	0732--XTO---23	0792-- a ---13
0673--X>Y---53	0733-- I ---65	0793-- E ---60
0674--GTO---44	0734-- 0 ---71	0794-- I ---65
0675--LBL---51	0735-- N ---73	0795-- N ---73
0676--RUP---22	0736--CNT---47	0796-- F ---16
0677--CNT---47	0737-- R ---62	0797-- 0 ---71
0678--FMT---42	0738--INT---64	0798-- a ---13
0679--FMT---42	0739-- R ---62	0799-- 0 ---61
0680-- H ---74	0740-- I ---65	0800-- I ---65
0681--CNT---47	0741-- L ---72	0801-- H ---73
0682-- G ---15	0742-- R ---62	0802-- G ---15
0683--XTO---23	0743-- B ---66	0803--CNT---47
0684-- a ---13	0744-- L ---72	0804-- # ---56
0685--CNT---47	0745-- E ---60	0805-- R ---62
0686--XTO---23	0746--CNT---47	0806-- D ---63
0687-- L ---72	0747-- F ---16	0807--CNT---47
0688--X<Y---52	0748-- 0 ---71	0808-- D ---63
0689-- I ---65	0749-- a ---13	0809-- # ---56
0690-- N ---73	0750--CNT---47	0810--X<Y---52
0691--YTO---40	0751--CNT---47	0811-- 0 ---71
0692-- I ---65	0752--CNT---47	0812--1/X---17
0693-- D ---63	0753-- a ---13	0813--XTO---23
0694-- E ---60	0754-- E ---60	0814--YTO---40
0695--PSE---57	0755-- I ---65	0815-- I ---65
0696--YTO---40	0756-- N ---73	0816-- D ---63
0697-- E ---60	0757-- F ---16	0817-- E ---60
0698--XTO---23	0758-- 0 ---71	0818--PSE---57
0699--CNT---47	0759-- a ---13	0819--SFL---54
0700-- H ---74	0760-- C ---61	0820--FMT---42
0701--SFL---54	0761-- E ---60	0821--STP---41
0702--XTO---23	0762-- M ---70	0822--PNT---45
0703-- L ---72	0763-- E ---60	0823--XTO---23
0704--SFL---54	0764-- N ---73	0824-- 0 ---00
0705--FMT---42	0765--XTO---23	0825-- 3 ---03
0706--PNT---45	0766--CLR---20	0826-- 7 ---07
0707-- UP---27	0767-- R ---62	0827--FMT---42
0708--LBL---51	0768-- 3 ---03	0828--FMT---42
0709--RUP---22	0769-- X ---06	0829-- D ---63
0710--XFR---67	0770--SFL---54	0830-- # ---56
0711-- 1 ---01	0771--FMT---42	0831--X<Y---52
0712-- 3 ---03	0772--PNT---45	0832-- I ---65
0713-- X ---36	0773--XTO---23	0833-- N ---73
0714-- 2 ---02	0774-- 2 ---02	0834--YTO---40
0715-- X ---36	0775-- 2 ---02	0835-- I ---65
0716-- DN---25	0776--LBL---51	0836-- D ---63
0717--FMT---42	0777-- N ---73	0837-- E ---60
0718--FMT---42	0778--FMT---42	0838--PSE---57
0719--CLR---20	0779--FMT---42	0839--SFL---54

0840--FMT---42
 0841--STP---41
 0842--PNT---45
 0843--XTO---23
 0844-- 0 ---00
 0845-- 3 ---03
 0846-- 8 ---10
 0847--XFR---67
 0848-- 0 ---00
 0849-- 3 ---03
 0850-- 7 ---07
 0851-- UP---27
 0852--XFR---67
 0853-- 0 ---00
 0854-- 1 ---01
 0855-- 5 ---05
 0856--X>Y---53
 0857--GTO---44
 0858--LBL---51
 0859-- 0 ---71
 0860--CNT---47
 0861--FMT---42
 0862--FMT---42
 0863-- D ---63
 0864-- π ---56
 0865--X<Y---52
 0866-- 0 ---71
 0867--1/X---17
 0868--XTO---23
 0869--YTO---40
 0870-- I ---65
 0871-- D ---63
 0872-- E ---60
 0873--PSE---57
 0874--PNT---45
 0875-- G ---15
 0876--XTO---23
 0877-- a ---13
 0878--CLR---20
 0879--PNT---45
 0880--PNT---45
 0881--PNT---45
 0882-- D ---63
 0883-- L ---72
 0884--X<Y---52
 0885-- 0 ---71
 0886--1/X---17
 0887--XTO---23
 0888--YTO---40
 0889-- I ---65
 0890-- D ---63
 0891-- E ---60
 0892--PSE---57
 0893--CLR---20
 0894--YTO---40
 0895-- E ---60
 0896--XTO---23
 0897--PNT---45
 0898-- D ---63
 0899-- π ---56

0900--SFL---54
 0901-- D ---63
 0902-- L ---72
 0903--SFL---54
 0904--FMT---42
 0905--PNT---45
 0906--XTO---23
 0907-- 0 ---00
 0908-- 3 ---03
 0909-- 7 ---07
 0910--GTO---44
 0911--LBL---51
 0912-- 6 ---14
 0913--CNT---47
 0914--LBL---51
 0915-- 0 ---71
 0916--KEY---30
 0917--XTO---23
 0918-- 0 ---00
 0919-- 3 ---03
 0920-- 7 ---07
 0921--LBL---51
 0922-- 6 ---14
 0923--XFR---67
 0924-- 0 ---00
 0925-- 3 ---03
 0926-- 8 ---10
 0927-- UP---27
 0928--XFR---67
 0929-- 0 ---00
 0930-- 1 ---01
 0931-- 5 ---05
 0932--X>Y---53
 0933--GTO---44
 0934--LBL---51
 0935-- a ---13
 0936--CNT---47
 0937--FMT---42
 0938--FMT---42
 0939-- D ---63
 0940-- π ---56
 0941--X<Y---52
 0942-- I ---65
 0943-- N ---73
 0944--YTO---40
 0945-- I ---65
 0946-- D ---63
 0947-- E ---60
 0948--PSE---57
 0949--PNT---45
 0950-- G ---15
 0951--XTO---23
 0952-- a ---13
 0953--CLR---20
 0954--PNT---45
 0955--PNT---45
 0956--PNT---45
 0957--PNT---45
 0958-- D ---63
 0959-- L ---72

0960--X<Y---52
 0961-- I ---65
 0962-- N ---73
 0963--YTO---40
 0964-- I ---65
 0965-- D ---63
 0966-- E ---60
 0967--PSE---57
 0968--CLR---20
 0969--YTO---40
 0970-- E ---60
 0971--XTO---23
 0972--PNT---45
 0973-- D ---63
 0974-- π ---56
 0975--SFL---54
 0976-- D ---63
 0977-- L ---72
 0978--SFL---54
 0979--FMT---42
 0980--PNT---45
 0981--XTO---23
 0982-- 0 ---00
 0983-- 3 ---03
 0984-- 8 ---10
 0985--GTO---44
 0986--LBL---51
 0987--YTO---40
 0988--CNT---47
 0989--CNT---47
 0990--LBL---51
 0991-- a ---13
 0992--KEY---30
 0993--XTO---23
 0994-- 0 ---00
 0995-- 3 ---03
 0996-- 8 ---10
 0997--LBL---51
 0998--YTO---40
 0999--XFR---67
 1000-- 0 ---00
 1001-- 3 ---03
 1002-- 7 ---07
 1003--XFR---67
 1004-- - ---34
 1005-- 0 ---00
 1006-- 0 ---00
 1007-- 9 ---11
 1008-- UP---27
 1009-- 2 ---02
 1010-- UP---27
 1011--XFR---67
 1012-- 0 ---00
 1013-- 1 ---01
 1014-- 3 ---03
 1015-- X ---36
 1016-- DN---25
 1017-- - ---34
 1018-- DN---25
 1019--XFR---67

1020-- X ---36	1080--FMT---42	1140--IND---31
1021-- 0 ---00	1081-- R ---62	1141-- 3 ---03
1022-- 3 ---03	1082-- 5 ---05	1142--SFL---54
1023-- 3 ---03	1083--X<Y---52	1143--FMT---42
1024--XFR---67	1084-- I ---65	1144--STP---41
1025-- X ---36	1085-- N ---73	1145--PNT---45
1026-- 0 ---00	1086--YTO---40	1146--XTO---23
1027-- 1 ---01	1087-- I ---65	1147-- 0 ---00
1028-- 4 ---04	1088-- D ---63	1148-- 2 ---02
1029--FMT---42	1089-- E ---60	1149-- 5 ---05
1030--FMT---42	1090--PSE---57	1150--FMT---42
1031-- R ---62	1091--SFL---54	1151--FMT---42
1032-- 5 ---05	1092--FMT---42	1152--IND---31
1033--X<Y---52	1093--PNT---45	1153-- 4 ---04
1034-- 0 ---71	1094--XTO---23	1154--SFL---54
1035--1/X---17	1095-- 0 ---00	1155--FMT---42
1036--XTO---23	1096-- ,4 ---04	1156--STP---41
1037--YTO---40	1097-- 0 ---00	1157--PNT---45
1038-- I ---65	1098--FMT---42	1158--XTO---23
1039-- D ---63	1099--FMT---42	1159-- 0 ---00
1040-- E ---60	1100--IND---31	1160-- 2 ---02
1041--PSE---57	1101-- E ---60	1161-- 6 ---06
1042--SFL---54	1102-- L ---72	1162--XFR---67
1043--FMT---42	1103-- D ---63	1163-- 1 ---01
1044--PNT---45	1104--PNT---45	1164-- 4 ---04
1045--XTO---23	1105-- L ---72	1165-- UP---27
1046-- 0 ---00	1106-- E ---60	1166--XFR---67
1047-- 3 ---03	1107-- G ---15	1167-- 1 ---01
1048-- 9 ---11	1108--PNT---45	1168-- 6 ---06
1049--XFR---67	1109-- L ---72	1169--X>Y---53
1050-- 0 ---00	1110-- E ---60	1170--GTO---44
1051-- 3 ---03	1111-- N ---73	1171--LBL---51
1052-- 8 ---10	1112-- G ---15	1172-- + ---33
1053--XFR---67	1113--XTO---23	1173--CNT---47
1054-- - ---34	1114-- H ---74	1174--FMT---42
1055-- 0 ---00	1115--CLR---20	1175--FMT---42
1056-- 0 ---00	1116--IND---31	1176--CLR---20
1057-- 9 ---11	1117-- 1 ---01	1177--IND---31
1058-- UP---27	1118--SFL---54	1178-- 1 ---01
1059-- 2 ---02	1119--FMT---42	1179--CNT---47
1060-- UP---27	1120--STP---41	1180-- 0 ---71
1061--XFR---67	1121--PNT---45	1181--1/X---17
1062-- 0 ---00	1122--XTO---23	1182--XTO---23
1063-- 1 ---01	1123-- 0 ---00	1183--YTO---40
1064-- 3 ---03	1124-- 2 ---02	1184-- I ---65
1065-- X ---36	1125-- 3 ---03	1185-- D ---63
1066-- DN---25	1126--FMT---42	1186-- E ---60
1067-- - ---34	1127--FMT---42	1187--CNT---47
1068-- DN---25	1128--IND---31	1188-- L ---72
1069--XFR---67	1129-- 2 ---02	1189-- I ---65
1070-- X ---36	1130--SFL---54	1190-- M ---70
1071-- 0 ---00	1131--FMT---42	1191-- I ---65
1072-- 3 ---03	1132--STP---41	1192--XTO---23
1073-- 3 ---03	1133--PNT---45	1193-- 0 ---71
1074--XFR---67	1134--XTO---23	1194-- F ---16
1075-- X ---36	1135-- 0 ---00	1195--CNT---47
1076-- 0 ---00	1136-- 2 ---02	1196-- a ---13
1077-- 3 ---03	1137-- 4 ---04	1197-- E ---60
1078-- 0 ---00	1138--FMT---42	1198-- I ---65
1079--FMT---42	1139--FMT---42	1199-- N ---73

ORIGINAL PAGE IS
OF POOR QUALITY

1200-- F ---16
1201-- O ---71
1202-- a ---19
1203-- C ---61
1204-- E ---60
1205-- M ---70
1206-- E ---60
1207-- N ---73
1208--X10---23
1209--X<Y---52
1210-- N ---73
1211-- O ---71
1212--X10---23
1213--CNT---47
1214-- C ---61
1215-- O ---71
1216-- N ---73
1217--Y10---40
1218-- I ---65
1219-- D ---63
1220-- E ---60
1221-- a ---13
1222-- E ---60
1223-- D ---63
1224--PSE---57
1225--FMT---42
1226-- O ---60
1227--X10---23
1228-- O ---60
1229-- 2 ---02
1230-- 3 ---03
1231--LBL---51
1232-- + ---33
1233--XFR---67
1234-- 3 ---03
1235-- O ---60
1236--UP---27
1237--XFR---67
1238-- 3 ---03
1239-- 5 ---05
1240--X>Y---53
1241--G10---44
1242--LBL---51
1243-- I ---01
1244--CNT---47
1245--FMT---42
1246--FMT---42
1247--CLR---20
1248--IND---31
1249-- 2 ---02
1250--CNT---47
1251-- O ---71
1252--1/X---17
1253--X10---23
1254--Y10---40
1255-- I ---65
1256-- 1 ---65
1259-- D ---63
1260-- 1 ---65
1261-- M ---70
1262-- I ---65
1263--X10---23
1264-- O ---71
1265-- F ---16
1266--CNT---47
1267-- a ---13
1268-- E ---60
1269-- I ---65
1270-- N ---73
1271-- F ---16
1272-- O ---71
1273-- a ---13
1274-- C ---61
1275-- E ---60
1276-- M ---70
1277-- E ---60
1278-- N ---73
1279--X10---23
1280--X<Y---52
1281-- N ---73
1282-- O ---71
1283--X10---23
1284--CNT---47
1285-- C ---61
1286-- O ---71
1287-- N ---73
1288--Y10---40
1289-- I ---65
1290-- D ---63
1291-- E ---60
1292-- a ---13
1293-- E ---60
1294-- D ---63
1295--PSE---57
1296--FMT---42
1297-- O ---60
1298--X10---23
1299-- O ---60
1300-- 2 ---02
1301-- 4 ---04
1302--LBL---51
1303-- 1 ---01
1304--XFR---67
1305-- 3 ---03
1306-- 7 ---07
1307--UP---27
1308--XFR---67
1309-- 1 ---01
1310-- 5 ---05
1311--X>Y---53
1312--G10---44
1313--LBL---51
1314-- 2 ---02
1315--CNT---47
1316--FMT---42
1317--FMT---42
1318--CLR---20
1319--IND---31
1320-- 3 ---03
1321--CNT---47
1322-- O ---71
1323--1/X---17
1324--X10---23
1325--Y10---40
1326-- I ---65
1327-- D ---63
1328-- E ---60
1329--CNT---47
1330-- L ---72
1331-- I ---65
1332-- M ---70
1333-- I ---65
1334--X10---23
1335-- O ---71
1336-- F ---16
1337--CNT---47
1338-- a ---13
1339-- E ---60
1340-- I ---65
1341-- N ---73
1342-- F ---16
1343-- O ---71
1344-- a ---13
1345-- C ---61
1346-- E ---60
1347-- M ---70
1348-- E ---60
1349-- N ---73
1350--X10---23
1351--X<Y---52
1352-- M ---73
1353-- O ---71
1354--X10---23
1355--CNT---47
1356-- C ---61
1357-- O ---71
1358-- N ---73
1359--Y10---40
1360-- I ---65
1361-- D ---63
1362-- E ---60
1363-- a ---13
1364-- E ---60
1365-- D ---63
1366--PSE---57
1367--FMT---42
1368-- O ---60
1369--X10---23
1370-- 2 ---02
1371-- 2 ---02
1372-- 5 ---05
1373--LBL---51
1374-- 2 ---02
1375--XFR---67
1376-- 3 ---03
1377-- 3 ---03
1378--UP---27
1379--XFR---67
1380-- 3 ---03
1381-- M ---70
1382-- I ---65
1383-- I ---65
1384--X10---23
1385-- O ---71
1386-- F ---16
1387--CNT---47
1388-- a ---13
1389-- E ---60
1390-- I ---65
1391-- N ---73
1392-- O ---71
1393--X10---23
1394-- O ---71
1395-- C ---61
1396-- E ---60
1397-- M ---70
1398-- N ---73
1399--Y10---40
1400-- I ---65
1401-- N ---73
1402-- F ---16
1403-- I ---65
1404--X10---23
1405-- Y10---40
1406-- I ---65
1407-- D ---63
1408-- E ---60
1409--CNT---47
1410-- 3 ---03
1411-- 2 ---02
1412--LBL---51
1413-- 2 ---02
1414-- 2 ---02
1415--X10---23
1416--Y10---40
1417--1/X---17
1418--X10---23
1419-- 2 ---02
1420--CNT---47
1421-- O ---71
1422-- 0 ---60
1423--X10---23
1424-- 2 ---02
1425-- 2 ---02
1426-- 3 ---03
1427-- 2 ---02
1428--XFR---67
1429-- 3 ---03
1430-- 7 ---07
1431--UP---27
1432--XFR---67
1433-- 1 ---01
1434-- 5 ---05
1435--X>Y---53
1436--G10---44
1437--LBL---51
1438-- 2 ---02
1439-- 2 ---02
1440-- 5 ---05
1441--G10---44
1442--LBL---51
1443-- 1 ---01
1444--CNT---47
1445--FMT---42
1446--FMT---42
1447--CLR---20
1448--IND---31
1449-- 2 ---02
1450--CNT---47
1451-- O ---71
1452--1/X---17
1453--X10---23
1454--Y10---40
1455-- 5 ---05
1456--X>Y---53
1457-- 3 ---03
1458-- 3 ---03
1459-- 5 ---05
1460--X10---23
1461-- 4 ---04
1462--LBL---51
1463-- 1 ---01
1464--XFR---67
1465-- 3 ---03
1466-- 7 ---07
1467--UP---27
1468--XFR---67
1469-- 1 ---01
1470-- 5 ---05
1471--X>Y---53
1472--G10---44
1473--LBL---51
1474-- 2 ---02
1475--XFR---67
1476-- 3 ---03
1477-- 2 ---02
1478--UP---27
1479--XFR---67
1480-- 3 ---03
1481-- 2 ---02
1482--LBL---51
1483-- 2 ---02
1484-- 5 ---05
1485--X10---23
1486-- 0 ---60
1487-- 0 ---60
1488--X10---23
1489-- 2 ---02
1490-- 4 ---04
1491-- D ---63
1492-- E ---60
1493-- a ---13
1494-- E ---60
1495-- D ---63
1496-- I ---65
1497-- N ---73
1498--Y10---40
1499-- 2 ---02
1500-- 2 ---02
1501-- 4 ---04
1502--LBL---51
1503-- 1 ---01
1504--XFR---67
1505-- 3 ---03
1506-- 7 ---07
1507--UP---27
1508--XFR---67
1509-- 1 ---01
1510-- 5 ---05
1511--X>Y---53
1512--G10---44
1513--LBL---51
1514-- 2 ---02
1515-- 2 ---02
1516-- 5 ---05
1517--X10---23
1518-- 2 ---02
1519-- 4 ---04
1520-- 5 ---05
1521--X10---23
1522-- 2 ---02
1523-- 2 ---02
1524-- 5 ---05
1525--X10---23
1526-- 0 ---60
1527-- 0 ---60
1528--X10---23
1529-- 2 ---02
1530-- 2 ---02
1531-- 4 ---04
1532--LBL---51
1533-- 1 ---01
1534--XFR---67
1535-- 3 ---03
1536-- 7 ---07
1537--UP---27
1538--XFR---67
1539-- 1 ---01
1540-- 5 ---05
1541--X>Y---53
1542--G10---44
1543--LBL---51
1544-- 2 ---02
1545-- 2 ---02
1546-- 5 ---05
1547--X10---23
1548-- 0 ---60
1549-- 0 ---60
1550--X10---23
1551-- 2 ---02
1552-- 2 ---02
1553-- 5 ---05
1554--X10---23
1555--CNT---47
1556-- C ---61
1557-- O ---71
1558-- N ---73
1559--Y10---40
1560-- I ---65
1561-- D ---63
1562-- E ---60
1563-- a ---13
1564-- E ---60
1565-- D ---63
1566--PSE---57
1567--FMT---42
1568-- O ---60
1569--X10---23
1570-- 2 ---02
1571-- 2 ---02
1572-- 5 ---05
1573--LBL---51
1574-- 2 ---02
1575--XFR---67
1576-- 3 ---03
1577-- 3 ---03
1578--UP---27
1579--XFR---67
1580-- 3 ---03
1581-- 2 ---02
1582--LBL---51
1583-- 2 ---02
1584-- 5 ---05
1585--X10---23
1586-- 0 ---60
1587-- 0 ---60
1588--X10---23
1589-- 2 ---02
1590-- 4 ---04
1591-- D ---63
1592-- E ---60
1593-- a ---13
1594-- E ---60
1595-- D ---63
1596-- I ---65
1597-- N ---73
1598--Y10---40
1599-- 2 ---02
1600-- 2 ---02
1601-- 4 ---04
1602--LBL---51
1603-- 1 ---01
1604--XFR---67
1605-- 3 ---03
1606-- 7 ---07
1607--UP---27
1608--XFR---67
1609-- 1 ---01
1610-- 5 ---05
1611--X>Y---53
1612--G10---44
1613--LBL---51
1614-- 2 ---02
1615-- 2 ---02
1616-- 5 ---05
1617--X10---23
1618-- 2 ---02
1619-- 4 ---04
1620-- 5 ---05
1621--X10---23
1622-- 0 ---60
1623-- 0 ---60
1624--X10---23
1625-- 2 ---02
1626-- 2 ---02
1627-- 5 ---05
1628--LBL---51
1629-- 2 ---02
1630-- 2 ---02
1631-- 5 ---05
1632--X10---23
1633-- 0 ---60
1634-- 0 ---60
1635--X10---23
1636-- 2 ---02
1637-- 2 ---02
1638-- 5 ---05
1639--LBL---51
1640-- 2 ---02
1641-- 2 ---02
1642-- 5 ---05
1643--X10---23
1644-- 0 ---60
1645-- 0 ---60
1646--X10---23
1647-- 2 ---02
1648-- 2 ---02
1649-- 5 ---05
1650--LBL---51
1651-- 2 ---02
1652-- 2 ---02
1653-- 5 ---05
1654--X10---23
1655-- 0 ---60
1656-- 0 ---60
1657--X10---23
1658-- 2 ---02
1659-- 2 ---02
1660-- 5 ---05
1661--LBL---51
1662-- 2 ---02
1663-- 2 ---02
1664-- 5 ---05
1665--X10---23
1666-- 0 ---60
1667-- 0 ---60
1668--X10---23
1669-- 2 ---02
1670-- 2 ---02
1671-- 5 ---05
1672--LBL---51
1673-- 2 ---02
1674-- 2 ---02
1675-- 5 ---05
1676--X10---23
1677-- 0 ---60
1678-- 0 ---60
1679--X10---23
1680-- 2 ---02
1681-- 2 ---02
1682-- 5 ---05
1683--LBL---51
1684-- 2 ---02
1685-- 2 ---02
1686-- 5 ---05
1687--X10---23
1688-- 0 ---60
1689-- 0 ---60
1690--X10---23
1691-- 2 ---02
1692-- 2 ---02
1693-- 5 ---05
1694--LBL---51
1695-- 2 ---02
1696-- 2 ---02
1697-- 5 ---05
1698--X10---23
1699-- 0 ---60
1700-- 0 ---60
1701--X10---23
1702-- 2 ---02
1703-- 2 ---02
1704-- 5 ---05
1705--LBL---51
1706-- 2 ---02
1707-- 2 ---02
1708-- 5 ---05
1709--X10---23
1710-- 0 ---60
1711-- 0 ---60
1712--X10---23
1713-- 2 ---02
1714-- 2 ---02
1715-- 5 ---05
1716--LBL---51
1717-- 2 ---02
1718-- 2 ---02
1719-- 5 ---05
1720--X10---23
1721-- 0 ---60
1722-- 0 ---60
1723--X10---23
1724-- 2 ---02
1725-- 2 ---02
1726-- 5 ---05
1727--LBL---51
1728-- 2 ---02
1729-- 2 ---02
1730-- 5 ---05
1731--X10---23
1732-- 0 ---60
1733-- 0 ---60
1734--X10---23
1735-- 2 ---02
1736-- 2 ---02
1737-- 5 ---05
1738--LBL---51
1739-- 2 ---02
1740-- 2 ---02
1741-- 5 ---05
1742--X10---23
1743-- 0 ---60
1744-- 0 ---60
1745--X10---23
1746-- 2 ---02
1747-- 2 ---02
1748-- 5 ---05
1749--LBL---51
1750-- 2 ---02
1751-- 2 ---02
1752-- 5 ---05
1753--X10---23
1754-- 0 ---60
1755-- 0 ---60
1756--X10---23
1757-- 2 ---02
1758-- 2 ---02
1759-- 5 ---05
1760--LBL---51
1761-- 2 ---02
1762-- 2 ---02
1763-- 5 ---05
1764--X10---23
1765-- 0 ---60
1766-- 0 ---60
1767--X10---23
1768-- 2 ---02
1769-- 2 ---02
1770-- 5 ---05
1771--LBL---51
1772-- 2 ---02
1773-- 2 ---02
1774-- 5 ---05
1775--X10---23
1776-- 0 ---60
1777-- 0 ---60
1778--X10---23
1779-- 2 ---02
1780-- 2 ---02
1781-- 5 ---05
1782--LBL---51
1783-- 2 ---02
1784-- 2 ---02
1785-- 5 ---05
1786--X10---23
1787-- 0 ---60
1788-- 0 ---60
1789--X10---23
1790-- 2 ---02
1791-- 2 ---02
1792-- 5 ---05
1793--LBL---51
1794-- 2 ---02
1795-- 2 ---02
1796-- 5 ---05
1797--X10---23
1798-- 0 ---60
1799-- 0 ---60
1800--X10---23
1801-- 2 ---02
1802-- 2 ---02
1803-- 5 ---05
1804--LBL---51
1805-- 2 ---02
1806-- 2 ---02
1807-- 5 ---05
1808--X10---23
1809-- 0 ---60
1810-- 0 ---60
1811--X10---23
1812-- 2 ---02
1813-- 2 ---02
1814-- 5 ---05
1815--LBL---51
1816-- 2 ---02
1817-- 2 ---02
1818-- 5 ---05
1819--X10---23
1820-- 0 ---60
1821-- 0 ---60
1822--X10---23
1823-- 2 ---02
1824-- 2 ---02
1825-- 5 ---05
1826--LBL---51
1827-- 2 ---02
1828-- 2 ---02
1829-- 5 ---05
1830--X10---23
1831-- 0 ---60
1832-- 0 ---60
1833--X10---23
1834-- 2 ---02
1835-- 2 ---02
1836-- 5 ---05
1837--LBL---51
1838-- 2 ---02
1839-- 2 ---02
1840-- 5 ---05
1841--X10---23
1842-- 0 ---60
1843-- 0 ---60
1844--X10---23
1845-- 2 ---02
1846-- 2 ---02
1847-- 5 ---05
1848--LBL---51
1849-- 2 ---02
1850-- 2 ---02
1851-- 5 ---05
1852--X10---23
1853-- 0 ---60
1854-- 0 ---60
1855--X10---23
1856-- 2 ---02
1857-- 2 ---02
1858-- 5 ---05
1859--LBL---51
1860-- 2 ---02
1861-- 2 ---02
1862-- 5 ---05
1863--X10---23
1864-- 0 ---60
1865-- 0 ---60
1866--X10---23
1867-- 2 ---02
1868-- 2 ---02
1869-- 5 ---05
1870--LBL---51
1871-- 2 ---02
1872-- 2 ---02
1873-- 5 ---05
1874--X10---23
1875-- 0 ---60
1876-- 0 ---60
1877--X10---23
1878-- 2 ---02
1879-- 2 ---02
1880-- 5 ---05
1881--LBL---51
1882-- 2 ---02
1883-- 2 ---02
1884-- 5 ---05
1885--X10---23
1886-- 0 ---60
1887-- 0 ---60
1888--X10---23
1889-- 2 ---02
1890-- 2 ---02
1891-- 5 ---05
1892--LBL---51
1893-- 2 ---02
1894-- 2 ---02
1895-- 5 ---05
1896--X10---23
1897-- 0 ---60
1898-- 0 ---60
1899--X10---23
1900-- 2 ---02
1901-- 2 ---02
1902-- 5 ---05
1903--LBL---51
1904-- 2 ---02
1905-- 2 ---02
1906-- 5 ---05
1907--X10---23
1908-- 0 ---60
1909-- 0 ---60
1910--X10---23
1911-- 2 ---02
1912-- 2 ---02
1913-- 5 ---05
1914--LBL---51
1915-- 2 ---02
1916-- 2 ---02
1917-- 5 ---05
1918--X10---23
1919-- 0 ---60
1920-- 0 ---60
1921--X10---23
1922-- 2 ---02
1923-- 2 ---02
1924-- 5 ---05
1925--LBL---51
1926-- 2 ---02
1927-- 2 ---02
1928-- 5 ---05
1929--X10---23
1930-- 0 ---60
1931-- 0 ---60
1932--X10---23
1933-- 2 ---02
1934-- 2 ---02
1935-- 5 ---05
1936--LBL---51
1937-- 2 ---02
1938-- 2 ---02
1939-- 5 ---05
1940--X10---23
1941-- 0 ---60
1942-- 0 ---60
1943--X10---23
1944-- 2 ---02
1945-- 2 ---02
1946-- 5 ---05
1947--LBL---51
1948-- 2 ---02
1949-- 2 ---02
1950-- 5 ---05
1951--X10---23
1952-- 0 ---60
1953-- 0 ---60
1954--X10---23
1955-- 2 ---02
1956-- 2 ---02
1957-- 5 ---05
1958--LBL---51
1959-- 2 ---02
1960-- 2 ---02
1961-- 5 ---05
1962--X10---23
1963-- 0 ---60
1964-- 0 ---60
1965--X10---23
1966-- 2 ---02
1967-- 2 ---02
1968-- 5 ---05
1969--LBL---51
1970-- 2 ---02
1971-- 2 ---02
1972-- 5 ---05
1973--X10---23
1974-- 0 ---60
1975-- 0 ---60
1976--X10---23
1977-- 2 ---02
1978-- 2 ---02
1979-- 5 ---05
1980--LBL---51
1981-- 2 ---02
1982-- 2 ---02
1983-- 5 ---05
1984--X10---23
1985-- 0 ---60
1986-- 0 ---60
1987--X10---23
1988-- 2 ---02
1989-- 2 ---02
1990-- 5 ---05
1991--LBL---51
1992-- 2 ---02
1993-- 2 ---02
1994-- 5 ---05
1995--X10---23
1996-- 0 ---60
1997-- 0 ---60
1998--X10---23
1999-- 2 ---02
2000-- 2 ---02
2001-- 5 ---05
2002--LBL---51
2003-- 2 ---02
2004-- 2 ---02
2005-- 5 ---05
2006--X10---23
2007-- 0 ---60
2008-- 0 ---60
2009--X10---23
2010-- 2 ---02
2011-- 2 ---02
2012-- 5 ---05
2013--LBL---51
2014-- 2 ---02
2015-- 2 ---02
2016-- 5 ---05
2017--X10---23
2018-- 0 ---60
2019-- 0 ---60
2020--X10---23
2021-- 2 ---02
2022-- 2 ---02
2023-- 5 ---05
2024--LBL---51
2025-- 2 ---02
2026-- 2 ---02
2027-- 5 ---05
2028--X10---23
2029-- 0 ---60
2030-- 0 ---60
2031--X10---23
2032-- 2 ---02
2033-- 2 ---02
2034-- 5 ---05
2035--LBL---51
2036-- 2 ---02
2037-- 2 ---02
2038-- 5 ---05
2039--X10---23
2040-- 0 ---60
2041-- 0 ---60
2042--X10---23
2043-- 2 ---02
2044-- 2 ---02
2045-- 5 ---05
2046--LBL---51
2047-- 2 ---02
2048-- 2 ---02
2049-- 5 ---05
2050--X10---23
2051-- 0 ---60
2052-- 0 ---60
2053--X10---23
2054-- 2 ---02
2055-- 2 ---02
2056-- 5 ---05
2057--LBL---51
2058-- 2 ---02
2059-- 2 ---02
2060-- 5 ---05
2061--X10---23
2062-- 0 ---60
2063-- 0 ---60
2064--X10---23
2065-- 2 ---02
2066-- 2 ---02
2067-- 5 ---05
2068--LBL---51
2069-- 2 ---02
2070-- 2 ---02
2071-- 5 ---05
2072--X10---23
2073-- 0 ---60
2074-- 0 ---60
2075--X10---23
2076-- 2 ---02
2077-- 2 ---02
2078-- 5 ---05
2079--LBL---51
2080-- 2 ---02
2081-- 2 ---02
2082-- 5 ---05
2083--X10---23
2084-- 0 ---60
2085-- 0 ---60
2086--X10---23
2087-- 2 ---02
2088-- 2 ---02
2089-- 5 ---05
2090--LBL---51
2091-- 2 ---02
2092-- 2 ---02
2093-- 5 ---05
2094--X10---23
2095-- 0 ---60
2096-- 0 ---60
2097--X10---23
2098-- 2 ---02
2099-- 2 ---02
2100-- 5 ---05
2101--LBL---51
2102-- 2 ---02
2103-- 2 ---02
2104-- 5 ---05
2105--X10---23
2106-- 0 ---60
2107-- 0 ---60
2108--X10---23
2109-- 2 ---02
2110-- 2 ---02
2111-- 5 ---05
2112--LBL---51
2113-- 2 ---02
2114-- 2 ---02
2115-- 5 ---05
2116--X10---23
2117-- 0 ---60
2118-- 0 ---60
2119--X10---23
2120-- 2 ---02
2121-- 2 ---02
2122-- 5 ---05
2123--LBL---51
2124-- 2 ---02
2125-- 2 ---02
2126-- 5 ---05
2127--X10---23
2128-- 0 ---60
2129-- 0 ---60
2130--X10---23
2131-- 2 ---02
2132-- 2 ---02
2133-- 5 ---05
2134--LBL---51
2135-- 2 ---02
2136-- 2 ---02
2137-- 5 ---05
2138--X10---23
2139-- 0 ---60
2140-- 0 ---60
2141--X10---23
2142-- 2 ---02
2143-- 2 ---02
2144-- 5 ---05
2145--LBL---51
2146-- 2 ---02
2147-- 2 ---02
2148-- 5 ---05
2149--X10---23
2150-- 0 ---60
2151-- 0 ---60
2152--X10---23
2153-- 2 ---02
2154-- 2 ---02
2155-- 5 ---05
2156--LBL---51
2157-- 2 ---02
2158-- 2 ---02
2159-- 5 ---05
2160--X10---23
2161-- 0 ---60
2162-- 0 ---60
2163--X10---23
2164-- 2 ---02
2165-- 2 ---02
2166-- 5 ---05
2167--LBL---51
2168-- 2 ---02
2169-- 2 ---02
2170-- 5 ---05
2171--X10---23
2172-- 0 ---60
2173-- 0 ---60
2174--X10---23
2175-- 2 ---02
2176-- 2 ---02
2177-- 5 ---05
2178--LBL---51
2179-- 2 ---02
2180-- 2 ---02
2181-- 5 ---05
2182--X10---23
2183-- 0 ---60
2184-- 0 ---60
2185--X10---23
2186-- 2 ---02
2187-- 2 ---02
2188-- 5 ---05
2189--LBL---51
2190-- 2 ---02
2191-- 2 ---02
2192-- 5 ---05
2193--X10---23
2194-- 0 ---60
2195-- 0 ---60
2196--X10---23
2197-- 2 ---02
2198-- 2 ---02
2199-- 5 ---05
2200--LBL---51
2201-- 2 ---02
2202-- 2 ---02
2203-- 5 ---05
2204--X10---23
2205-- 0 ---60
2206-- 0 ---60
2207--X10---23
2208-- 2 ---02
2209-- 2 ---02
2210-- 5 ---05
2211--LBL---51
2212-- 2 ---02
2213-- 2 ---02
2214-- 5 ---05
2215--X10---23
2216-- 0 ---60
2217-- 0 ---60
2218--X10---23
2219-- 2 ---02
2220-- 2 ---02
2221-- 5 ---05
2222--LBL---51
2223-- 2 ---02
2224-- 2 ---02
2225-- 5 ---05
2226--

1380-- 1 ---01
 1381-- 5 ---05
 1382--X>Y---53
 1383--GTO---44
 1384--LBL---51
 1385-- 3 ---03
 1386--CNT---47
 1387--FMT---42
 1388--FMT---42
 1389--CLR---20
 1390--IND---31
 1391-- 4 ---04
 1392--CNT---47
 1393-- 0 ---71
 1394--1/X---17
 1395--XTO---23
 1396--YTO---40
 1397-- I ---65
 1398-- D ---63
 1399-- E ---60
 1400--CNT---47
 1401-- L ---72
 1402-- I ---65
 1403-- M ---70
 1404-- I ---65
 1405--XTO---23
 1406-- 0 ---71
 1407-- F ---16
 1408--CNT---47
 1409-- a ---13
 1410-- E ---60
 1411-- I ---65
 1412-- N ---73
 1413-- F ---16
 1414-- 0 ---71
 1415-- a ---13
 1416-- C ---61
 1417-- E ---60
 1418-- M ---70
 1419-- E ---60
 1420-- N ---73
 1421--XTO---23
 1422--X<Y---52
 1423-- N ---73
 1424-- 0 ---71
 1425--XTO---23
 1426--CNT---47
 1427-- C ---61
 1428-- 0 ---71
 1429-- N ---73
 1430--YTO---40
 1431-- I ---65
 1432-- D ---63
 1433-- E ---60
 1434-- a ---13
 1435-- E ---60
 1436-- D ---63
 1437--PSE---57
 1438--FMT---42
 1439-- 0 ---00

1440--XTO---23
 1441-- 0 ---00
 1442-- 2 ---02
 1443-- 6 ---06
 1444--LBL---51
 1445-- 3 ---03
 1446--XFR---67
 1447-- 2 ---02
 1448-- 3 ---03
 1449--XSO---12
 1450-- UP---27
 1451--XFR---67
 1452-- 0 ---00
 1453-- 2 ---02
 1454-- 4 ---04
 1455--XSO---12
 1456-- + ---33
 1457--XFR---67
 1458-- 9 ---09
 1459-- 2 ---02
 1460-- 5 ---05
 1461--XSO---12
 1462-- + ---33
 1463--XFR---67
 1464-- 0 ---00
 1465-- 2 ---02
 1466-- 6 ---06
 1467--XSO---12
 1468-- + ---33
 1469--CNT---47
 1470--CNT---47
 1471-- DN---25
 1472--FMT---42
 1473--FMT---42
 1474--CLR---20
 1475--IND---31
 1476-- E ---60
 1477-- L ---72
 1478-- D ---63
 1479--PNT---45
 1480-- A ---62
 1481--INT---64
 1482-- A ---62
 1483-- I ---65
 1484-- L ---72
 1485-- A ---62
 1486-- B ---66
 1487-- L ---72
 1488-- E ---60
 1489--CLR---20
 1490-- F ---16
 1491-- 0 ---71
 1492-- a ---13
 1493--PNT---45
 1494-- a ---13
 1495-- E ---60
 1496-- I ---65
 1497-- M ---73
 1498-- F ---16
 1499-- 0 ---71

1500-- a ---13
 1501-- C ---61
 1502-- M ---70
 1503-- E ---60
 1504-- N ---73
 1505--XTO---23
 1506-- A ---62
 1507-- 4 ---04
 1508-- X ---36
 1509--SFL---54
 1510--FMT---42
 1511--PNT---45
 1512--XTO---23
 1513-- 2 ---02
 1514-- 7 ---07
 1515--XFR---67
 1516-- 1 ---01
 1517-- 3 ---03
 1518--XFR---67
 1519-- - ---34
 1520-- 9 ---09
 1521--XTO---23
 1522-- 4 ---04
 1523-- 2 ---02
 1524--XFR---67
 1525-- X ---36
 1526-- 1 ---01
 1527-- 2 ---02
 1528-- MP---27
 1529-- 5 ---05
 1530-- X ---36
 1531--YTO---40
 1532-- 4 ---04
 1533-- 1 ---01
 1534--XFR---67
 1535-- 4 ---04
 1536-- 2 ---02
 1537-- UP---27
 1538-- 2 ---02
 1539-- X ---36
 1540-- 2 ---02
 1541-- . ---21
 1542-- 5 ---05
 1543--XFR---67
 1544-- X ---36
 1545-- 1 ---01
 1546-- 3 ---03
 1547-- UP---27
 1548--XFR---67
 1549-- 1 ---01
 1550-- 4 ---04
 1551-- + ---33
 1552-- DN---25
 1553-- X ---36
 1554--YTO---40
 1555-- 4 ---04
 1556-- 3 ---03
 1557--XFR---67
 1558-- 0 ---00
 1559-- 4 ---04

1560-- 1 ---01
 1561--X<Y---52
 1562--GTO---44
 1563--LBL---51
 1564-- DN---25
 1565--CNT---47
 1566--XEY---30
 1567--LBL---51
 1568-- DN---25
 1569--FMT---42
 1570--FMT---42
 1571-- N ---73
 1572-- O ---71
 1573--XSO---12
 1574-- . ---21
 1575--CNT---47
 1576--IND---31
 1577-- R ---62
 1578-- L ---72
 1579-- L ---72
 1580--CNT---47
 1581-- R ---62
 1582--INT---64
 1583-- R ---62
 1584-- I ---65
 1585-- L ---72
 1586--CNT---47
 1587-- F ---16
 1588-- O ---71
 1589-- a ---13
 1590--CNT---47
 1591-- a ---13
 1592-- E ---60
 1593-- I ---65
 1594-- N ---73
 1595-- F ---16
 1596-- O ---71
 1597-- a ---13
 1598-- C ---61
 1599-- M ---70
 1600-- E ---60
 1601-- N ---73
 1602--XTO---20
 1603-- R ---62
 1604-- 2 ---02
 1605-- X ---36
 1606--SFL---54
 1607--FMT---42
 1608--PNT---45
 1609-- UP---27
 1610--XFR---67
 1611-- 1 ---01
 1612-- 9 ---11
 1613-- + ---33
 1614--XFR---67
 1615-- 2 ---02
 1616-- 2 ---02
 1617-- + ---33
 1618--XFR---67
 1619-- 2 ---02

ORIGINAL PAGE IS
 OF POOR QUALITY

1620-- 7 ---07
 1621-- + ---33
 1622--XFR---67
 1623-- 3 ---03
 1624-- 9 ---11
 1625-- + ---33
 1626--XFR---67
 1627-- 4 ---04
 1628-- 0 ---00
 1629-- + ---33
 1630--XEY---30
 1631--FMT---42
 1632--FMT---42
 1633-- R ---62
 1634--X<Y---52
 1635--YTO---40
 1636--1/X---17
 1637-- M ---70
 1638--PSE---57
 1639--SFL---54
 1640--CLR---20
 1641--X<Y---52
 1642-- R ---62
 1643-- 1 ---01
 1644-- + ---33
 1645-- R ---62
 1646-- 2 ---02
 1647-- X ---36
 1648-- + ---33
 1649-- R ---62
 1650-- 3 ---03
 1651-- X ---36
 1652-- + ---33
 1653-- R ---62
 1654-- 4 ---04
 1655-- X ---36
 1656-- + ---33
 1657-- R ---62
 1658-- 5 ---05
 1659--X<Y---52
 1660-- O ---71
 1661--1/X---17
 1662--XTO---20
 1663--PSE---57
 1664-- + ---33
 1665-- R ---62
 1666-- 5 ---05
 1667--X<Y---52
 1668-- I ---65
 1669-- N ---73
 1670--PSE---57
 1671--PSE---57
 1672--SFL---54
 1673--FMT---42
 1674--PNT---45
 1675-- UP---27
 1676--XFR---67
 1677-- 1 ---01
 1678-- 1 ---01
 1679--FMT---42

1680--FMT---42
 1681-- R ---62
 1682--X<Y---52
 1683-- a ---13
 1684-- E ---60
 1685-- b ---14
 1686-- D ---63
 1687--PSE---57
 1688--SFL---54
 1689--FMT---42
 1690--PNT---45
 1691--X>Y---53
 1692--GTO---44
 1693--LBL---51
 1694--XFR---67
 1695--CNT---47
 1696--FMT---42
 1697--FMT---42
 1698--CNT---47
 1699--CNT---47
 1700--CNT---47
 1701--YTO---40
 1702--1/X---17
 1703-- F ---16
 1704-- F ---16
 1705-- I ---65
 1706-- C ---61
 1707-- I ---65
 1708-- E ---60
 1709-- N ---73
 1710--XTO---20
 1711--CLR---20
 1712--CNT---47
 1713--CNT---47
 1714-- a ---13
 1715-- E ---60
 1716-- I ---65
 1717-- N ---73
 1718-- F ---16
 1719-- O ---71
 1720-- a ---13
 1721-- C ---61
 1722-- I ---65
 1723-- N ---73
 1724-- G ---15
 1725--CLR---20
 1726--CLR---20
 1727--CLR---20
 1728--CLR---20
 1729--CLR---20
 1730-- I ---65
 1731-- F ---16
 1732--CNT---47
 1733-- a ---13
 1734-- E ---60
 1735-- I ---65
 1736-- N ---73
 1737-- F ---16
 1738-- O ---71
 1739-- a ---13

1740-- C ---61	1800-- I ---65	1860--CLR---20
1741-- E ---60	1801-- N ---73	1861--CLR---20
1742-- M ---70	1802-- G ---15	1862--CLR---20
1743-- E ---60	1803--CNT---47	1863--CLR---20
1744-- N ---73	1804-- n ---56	1864--CLR---20
1745--XTO---23	1805-- A ---62	1865--CLR---20
1746--CNT---47	1806-- D ---63	1866--FMT---42
1747--CNT---47	1807--X<Y---52	1867--STP---41
1748-- I ---65	1808--YTO---40	1868--GTO---44
1749--YTO---40	1809--PSE---57	1869--LBL---51
1750--CNT---47	1810--CNT---47	1870-- F ---16
1751--XTO---23	1811--CNT---47	1871--END---46
1752-- O ---71	1812--CNT---47	
1753-- O ---71	1813--CNT---47	
1754--CNT---47	1814-- n ---56	
1755-- G ---15	1815-- A ---62	
1756-- a ---13	1816-- a ---13	
1757-- E ---60	1817-- A ---62	
1758-- A ---62	1818-- M ---70	
1759--XTO---23	1819-- E ---60	
1760--CNT---47	1820--XTO---23	
1761--CNT---47	1821-- E ---60	
1762--CNT---47	1822-- a ---13	
1763--CNT---47	1823--YTO---40	
1764-- D ---63	1824--CLR---20	
1765-- E ---60	1825--CLR---20	
1766--YTO---40	1826--CLR---20	
1767-- I ---65	1827--XTO---23	
1768-- G ---15	1828-- O ---71	
1769-- N ---73	1829--CNT---47	
1770-- E ---60	1830-- E ---60	
1771-- a ---13	1831-- YE---24	
1772--CNT---47	1832-- E ---60	
1773-- M ---70	1833-- a ---13	
1774-- A ---62	1834-- C ---61	
1775--XFR---67	1835-- I ---65	
1776--CNT---47	1836--YTO---40	
1777--CNT---47	1837-- E ---60	
1778--CNT---47	1838--CNT---47	
1779--CNT---47	1839-- O ---71	
1780--CNT---47	1840-- n ---56	
1781-- O ---71	1841--XTO---23	
1782-- n ---56	1842-- N ---73	
1783--XTO---23	1843--CNT---47	
1784-- I ---65	1844--CNT---47	
1785-- M ---70	1845-- n ---56	
1786-- I ---65	1846-- a ---13	
1787--XCO---12	1847-- E ---60	
1788-- E ---60	1848--YTO---40	
1789--CNT---47	1849--YTO---40	
1790-- B ---66	1850--CNT---47	
1791--XFR---67	1851--X<Y---52	
1792--CNT---47	1852-- C ---61	
1793--CNT---47	1853-- O ---71	
1794--CNT---47	1854-- M ---73	
1795--CNT---47	1855--XTO---23	
1796--INT---64	1856--PSE---57	
1797-- A ---62	1857--CLR---20	
1798-- a ---13	1858--CLR---20	
1799--XFR---67	1859--CLR---20	

OPERATING HINTS

TE is defined as the thickness of an attached reinforcing pad or height of the largest 60-deg right triangle supported by the vessel and nozzle outside diameter projected surfaces and lying completely within the area of integral reinforcement (see Fig UG-40 ref. 1). When calculating A2 (area of the nozzle wall available) for integral reinforcement, TE is defined by a configuration such as UG-40 (d) (ref. 1). In calculating A5 (metal in pad(s) available for reinforcement), TE is defined as the average height of the reinforcing pad (see example 4 p. 395 ref. 1). Since the program uses the same value of TE to calculate both A2 and A5, it is recommended that the smaller value be used for TE. This will result in a slightly conservative answer for A2 (See Example 3).

If the reinforcing pad is smaller than the reinforcement limits, the total weld area (even though some may be outside the limit) will be considered for reinforcement by the program.

This program was written to utilize the Hewlett-Packard 9865A Tape Cassette in conjunction with the 9810A Electronic Calculator. For users not having a tape cassette, the program may be run using magnetic cards by performing the following operations:

- a. Place program from Tape 1 - File 0 (see p. 25) in calculator.
- b. Go to step 1600 of Tape 1-File 0 (shown on page 34) and rewrite the program as shown on the card tape (page 46).
- c. With program in the calculator, start at step 0020 and record on a 10-1/2 inch magnetic card and label the card "#1".
- d. Place program from Tape 1 - File 1 (see pages 34-44) in calculator.
- e. Start at step 0020 and record on a 10-1/2 inch magnetic card and label card "#2".

These two cards are now sufficient to run the program. To run, load card "#1" in calculator starting at step 0000 and press END, CONT. Program will run as with tape considering no reinforcing pads. If reinforcement is not sufficient, program will stop and print the following message: LOAD CARD "#2". User must press LOAD and insert card "#2" into calculator to consider reinforcement pads. After loading card "#2" press END, CONT. and proceed. An option is still provided to optimize the reinforcement supplied.

TAPE TO CARD CONVERSION

1575--X>Y---53	1607--PNT---45
1576--GTO---44	1608--PNT---45
1577--LBL---51	1609--PNT---45
1578-- E ---60	1610--YTD---40
1579--CNT---47	1611--1/X---17
1580--FMT---42	1612-- F ---16
1581--FMT---42	1613-- F ---16
1582--CLR---20	1614-- I ---65
1583--CLR---20	1615-- C ---61
1584-- L ---72	1616-- I ---65
1585-- O ---71	1617-- E ---60
1586-- A ---62	1618-- N ---73
1587-- D ---63	1619--XTO---23
1588--CNT---47	1620--PNT---45
1589-- C ---61	1621--PNT---45
1590-- A ---62	1622--PNT---45
1591-- o ---13	1623--PNT---45
1592-- D ---63	1624--PNT---45
1593--CNT---47	1625-- o ---13
1594-- 2 ---02	1626-- E ---60
1595--CLR---20	1627-- I ---65
1596--FMT---42	1628-- N ---73
1597--GTO---44	1629-- F ---16
1598-- 1 ---01	1630-- O ---71
1599-- 6 ---06	1631-- o ---13
1600-- 3 ---03	1632-- C ---61
1601-- 8 ---10	1633-- I ---65
1602--CNT---47	1634-- N ---73
1603--LBL---51	1635-- G ---15
1604-- E ---60	1636--FMT---42
1605--FMT---42	1637--STP---41
1606--FMT---42	1638--END---46

ORIGINAL PAGE IS
OF POOR QUALITY

CONCLUDING REMARKS

This computer-aided-design program presents an "interactive" procedure for the engineer, utilizing an electronic desk top calculator, to obtain reinforcement requirements for an opening in a cylindrical pressure vessel subject to internal pressure. The area of reinforcement required for an opening is calculated and compared with the area of reinforcement provided by a proposed design. The program considers as reinforcement: metal in the shell and nozzle not needed to restrain pressure, an inner projection of a nozzle, weld metal, and reinforcing pad(s). The design equations utilized in the program are from reference 1.

The program is written for a Hewlett-Packard Model 9810A Calculator with cassette memory. The necessary program modifications are provided to run the program from magnetic cards.

The program can be modified for a spherical shell under internal pressure by changing the design equations for shell thickness.

REFERENCES

1. American Society of Mechanical Engineers: Boiler and Pressure Vessel Code, Section VIII, Division I, 1974 Edition.
2. Hewlett-Packard 9810A "Programming," "Printer Alpha ROM," "Mathematics Block," and "Cassette Memory" Calculator Operating Manuals, 1972.