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|  QUALIFICATION          |
|  REQUIREMENTS           |
|  REMOVED                |
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MILITARY SPECIFICATION

MICROCIRCUITS, DIGITAL, 512 BIT, BIPOLAR,
PROGRAMMABLE READ-ONLY MEMORY (PROM), MONOLITHIC SILICON

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| INACTIVE FOR NEW DESIGN AFTER DATE OF THIS REVISION |
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This specification is approved for use by all Depart-
ments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the detail requirements for monolithic
silicon, PROM microcircuits which employ thin film nichrome resistors as the fusible
link or programming element. One product assurance class and a choice of case
outlines and lead finishes are provided for each type and are reflected in the part
number.

1.2 Part number. The part number shall be in accordance with MIL-M-38510 except
the JAN or "J" certification shall not be used.

1.2.1 Device type. The device type shall be as follows:

Device type	Circuit
01	64 words/8 bits per word PROM with open collector
02	64 words/8 bits per word PROM with internal pull-up resistor

1.2.2 Device class. The device class shall be the product assurance level as
defined in MIL-M-38510.

1.2.3 Case outline. The case outline shall be designated as follows:

Letter	Case outline (see MIL-M-38510, appendix C)
J	D-3 (24-lead, 1/2" x 1-1/4"), dual-in-line package
K	F-6 (24-lead, 3/8" x 5/8"), flat package
Z	F-8 (24-lead, 1/4" x 3/8"), flat package

1.3 Absolute maximum ratings.

Supply voltage range - - - - - - - - - - - - -	-0.5 V dc to +7.0 V dc
Input voltage range- - - - - - - - - - - - - -	-1.5 V dc at -12 mA to +5.5 V dc
Storage temperature range- - - - - - - - - -	-65° to +150°C
Lead temperature (soldering, 10 seconds) - -	300°C
Thermal resistance, junction-to-case (θ_{JC})1/:	See MIL-M-38510, appendix C

1/ Heat sinking is recommended to reduce junction temperature.

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| Beneficial comments (recommendations, additions, deletions) and any pertinent data |
| which may be of use in improving this document should be addressed to: Rome Air    |
| Development Center (RBE-2), Griffiss AFB, NY 13441, by using the self-addressed     |
| Standardization Document Improvement Proposal (DD Form 1426) appearing at the end   |
| of this document or by letter.                                                      |
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1

Output supply voltage range- - - - - - - - -	-0.5 V dc to +7.0 V dc
Output sink current- - - - - - - - - - - - -	+30 mA
Maximum power dissipation (P$_D$)2/ - - - - -	575 mW dc
Maximum junction temperature (T$_J$) 3/ - - -	175°C

1.4 <u>Recommended operating conditions:</u>

Supply voltage - - - - - - - - - - - - - - -	4.75 V dc minimum to 5.25 V dc maximum
Minimum high level input voltage (V$_{IH}$) - -	2.0 V dc
Maximum low level input voltage (V$_{IL}$)- -	0.8 V dc
Normalized fanout (each output) 4/ - - - - -	6 maximum (10 mA)
Case operating temperature range (T$_C$)- - -	-55° to +125°C

2. APPLICABLE DOCUMENTS

2.1 <u>Government documents.</u>

2.1.1 <u>Specifications and standards.</u> Unless otherwise specified, the following specification and standard, of the issue listed in that issue of the Department of Defense Index of Specifications and Standards specified in the solicitation, form a part of this specification to the extent specified herein.

SPECIFICATION

    MILITARY

        MIL-M-38510 - Microcircuits, General Specification for.

STANDARD

    MILITARY

        MIL-STD-883 - Test Methods and Procedures for Microelectronics.

(Copies of the specification and standard required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

2.2 <u>Order of precedence.</u> In the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 <u>Detail specification.</u> The individual item requirements shall be in accordance with MIL-M-38510, and as specified herein. An altered item drawing shall be prepared by the contracting activity to specify the required program configuration.

3.2 <u>Design, construction, and physical dimensions.</u> The design, construction, and physical dimensions shall be as specified in MIL-M-38510 and herein.

3.2.1 <u>Terminal connections.</u> The terminal connections shall be as specified on figure 1.

2/ Must withstand the added P$_D$ due to short circuit test (e.g., I$_{OS}$).

3/ Maximum junction temperature shall not be exceeded except for allowable short duration burn-in screening conditions per method 5004 of MIL-STD-883.

4/ The device shall fan out in both high and low levels to the specified number of inputs of the same device type as that being tested.

TABLE I. Electrical performance characteristics.

Characteristic	Symbol	Conditions	Device type	Min	Max	Unit
High level output voltage	V_{OH}	$V_{CC} = 4.75$ V $V_{IN} = 0.8$ V $I_{OH} = 500$ µA	02	2.4	---	V
Low level output voltage	V_{OL}	$V_{CC} = 4.75$ V $V_{IN} = 2.0$ V $I_{OL} = 10$ mA	01 (Ckt A)	---	0.45	V
			01 (Ckt B), 02	---	0.50	V
Input clamp voltage	V_{IC}	$V_{CC} = 4.75$ V $I_{IN} = -12$ mA $T_C = 25°C$	01, 02	---	-1.5	V
Maximum collector cut-off current	I_{CEX1}	$V_{CC} = 5.25$ V $V_{OH} = 2.8$ V $V_{IN} = 0.8$ V	01	---	100	µA
	I_{CEX2}	$V_{CC} = 5.25$ V $V_{OH} = 5.25$ V $V_{IN} = 0.8$ V	01	---	200	µA
High level input current	I_{IH1}	$V_{CC} = 5.25$ V $V_{IN} = 2.4$ V 1/	01, 02	---	60	µA
	I_{IH2}	$V_{CC} = 5.25$ V $V_{IN} = 5.25$ V 2/	01, 02	---	100	µA
Low level input current	I_{IL}	$V_{CC} = 5.25$ V $V_{IN} = 0.4$ V 2/	01, 02	-0.2	-1.6	mA
Short circuit output current	I_{OS}	$V_{CC} = 5.25$ V $V_{IN} = 0$ 3/	02	-1.6	-5.0	mA
Supply current	I_{CC}	$V_{CC} = 5.25$ V $V_{IN} = 0$	01, 02	---	100	mA
Propagation delay time high-to-low level logic	t_{PHL}	$V_{CC} = 5.0$ V Figure 6	01, 02	25	140	ns
Propagation delay time low-to-high level logic	t_{PLH}		01, 02	25	140	ns

1/ When testing one E input, apply GND to the other.

2/ When testing one E input, apply 5.25 V to the other.

3/ Not more than one output shall be grounded at one time.

3.2.2 <u>Truth table.</u>

3.2.2.1 <u>Unprogrammed devices.</u> The truth table for unprogrammed devices for contracts involving no altered item drawing shall be as specified on figure 2. When required in group A, B, or C inspection (see 4.4), the devices shall be programmed by the manufacturer prior to test in a checkerboard pattern (a minimum of 50 percent of the total number of bits programmed) or to any altered item drawing pattern which includes at least 25 percent of the total number of bits programmed.

3.2.2.2 <u>Programmed devices.</u> The truth table for programmed devices shall be as specified by the altered item drawing.

3.2.3 <u>Logic diagrams and schematic circuits.</u> The logic diagrams and schematic circuits shall be as specified on figures 3 and 4.

3.2.4 <u>Case outlines.</u> The case outlines shall be as specified in 1.2.3.

3.3 <u>Lead material and finish.</u> The lead material and finish shall be in accordance with MIL-M-38510 (see 6.5).

3.4 <u>Electrical performance characteristics.</u> The electrical performance characteristics of table I apply over the full recommended case operating temperature range, unless otherwise specified.

3.5 <u>Electrical test requirements.</u> The electrical test requirements for class B devices shall be the subgroups specified in table II. The electrical tests for each subgroup are described in table III.

TABLE II. <u>Electrical test requirements.</u>

MIL-STD-883 test requirements	Subgroups (see table III)
	Class B devices
Interim electrical test parameters (method 5004)	1
Final electrical test parameters (method 5004) for unprogrammed devices	1*, 2, 3, 7*, 8
Final electrical test parameters (method 5004) for programmed devices	1*, 2, 3, 7*, 8, 9
Group A test requirements (method 5005)	1,2,3,7,8, 9, 10, 11
Group C end-point electrical parameters (method 5005)	1,2,3,7,8
Group D end-point electrical parameters (method 5005)	1,2,3,7,8

NOTES:

1. * indicates PDA applies to subgroups 1 and 7 (see 4.2c).
2. Any or all subgroups may be combined when using high speed testers.
3. Subgroups 7 and 8 shall consist of verifying the pattern specified.

Device types 01 and 02 (note 4)

FIGURE 1. Terminal connections.
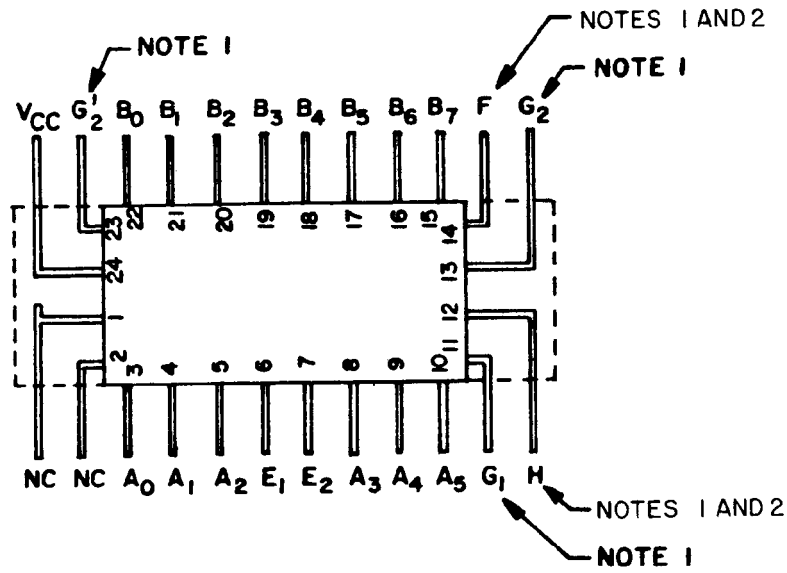
NOTES:
1. G_1, G_2 and G'_2 are connected to ground and F and H are left open for normal operation.
2. Terminal F is electrically open in device type 01, circuit A and is connected to an internal inverter (9th bit) for device type 01, circuit B and device type 02.
3. Terminal H is electrically open in device type 01, circuit B and device type 02 and is internally connected to the base of the memory transistor for device type 01, circuit A.
4. Pin connections are the same for all case outlines.

Word No.	INPUTS							OUTPUTS							
	$E^{1/}$	A_5	A_4	A_3	A_2	A_1	A_0	B_7	B_6	B_5	B_4	B_3	B_2	B_1	B_0
$X^{2/}$	L	X	X	X	X	X	X	H	H	H	H	H	H	H	H
X	H	X	X	X	X	X	X	L	L	L	L	L	L	L	L

NOTES:
1/ $E = E_1 \cdot E_2$
2/ X = Irrelevant

FIGURE 2. Truth table (unprogrammed).

FIGURE 3. Logic diagram and schematic circuit for device type 01,
circuit B and device type 02.
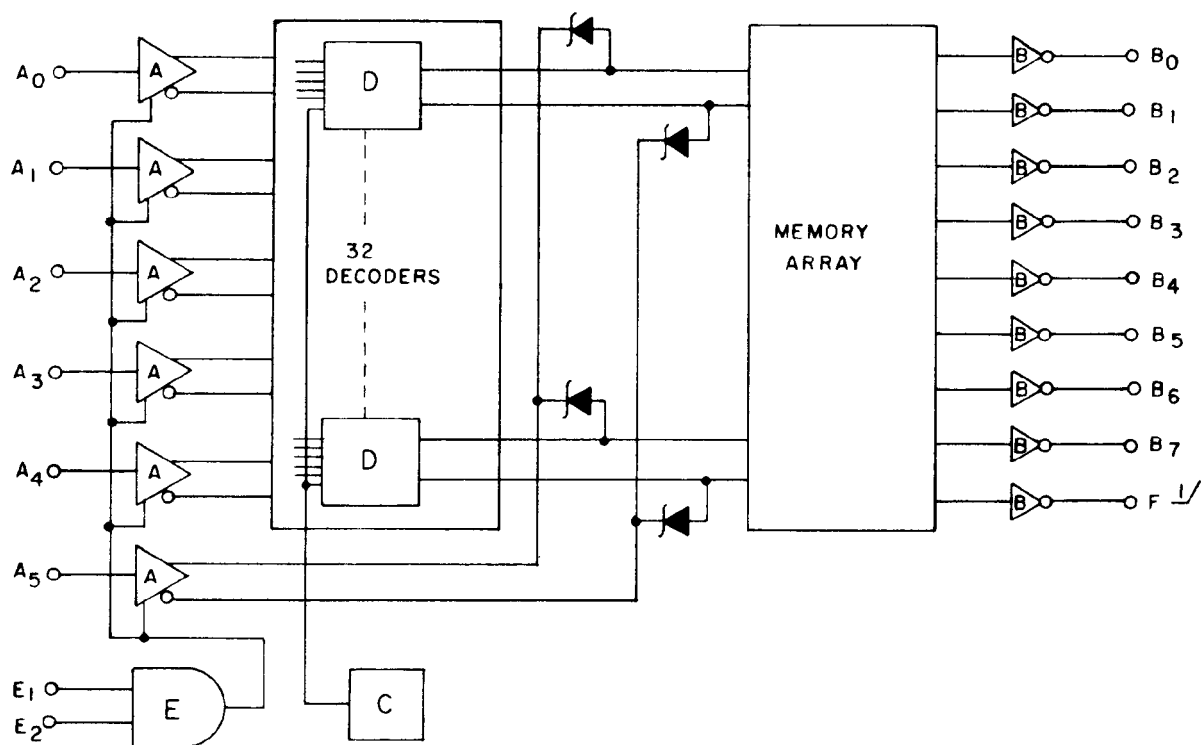
NOTES:

1/ Terminal F provides a 9th bit for test purposes only.

2/ AR_1 = 3kΩ and AR_2 = AR_3 = AR_4 = 2.2kΩ except in amplifier-inverter A_5 where AR_1 = 2.2kΩ, AR_2 = AR_4 = 1.2kΩ and AR_3 = 1.8kΩ.

3/ The 2kΩ pull-up resistor is used for device type 02 only.

4/ All resistance values are nominal.

5/ G_2 and G'_2 are internally connected together.

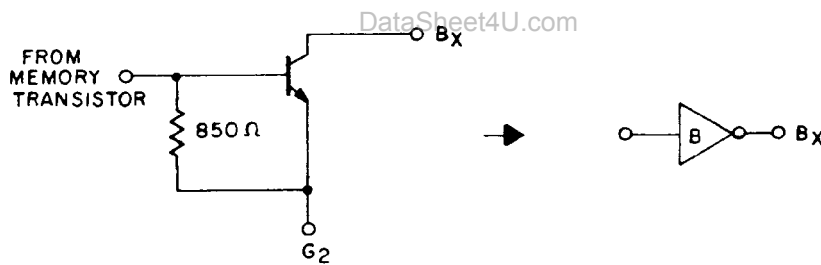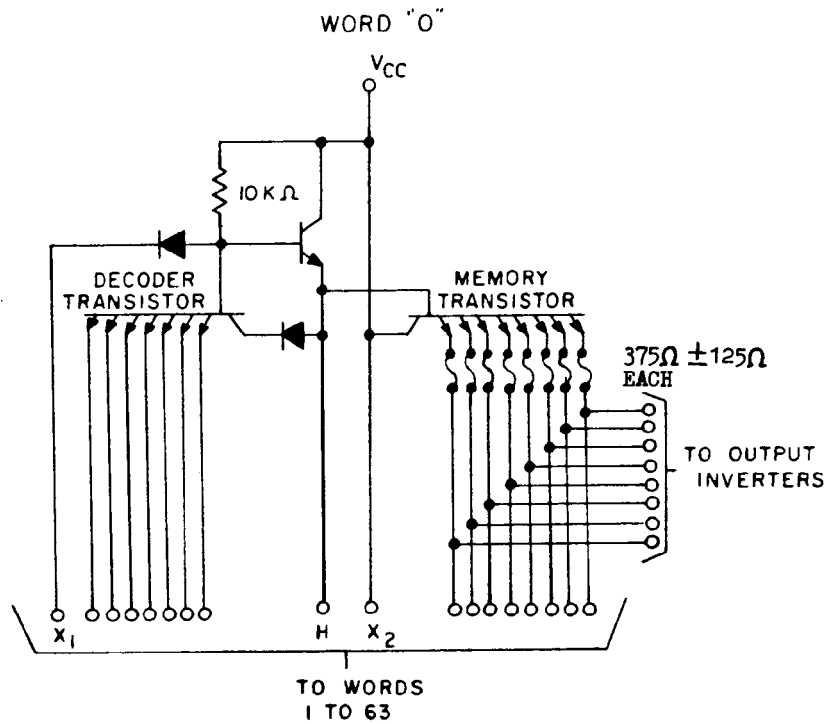FIGURE 3. Logic diagram and schematic circuit for device type 01, circuit B and device type 02 - Continued.

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FIGURE 3. Logic diagram and schematic circuit for device type 01,
circuit B and device type 02 - Continued.

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FIGURE 3. Logic diagram and schematic circuit for device type 01, circuit B and device type 02 - Continued.

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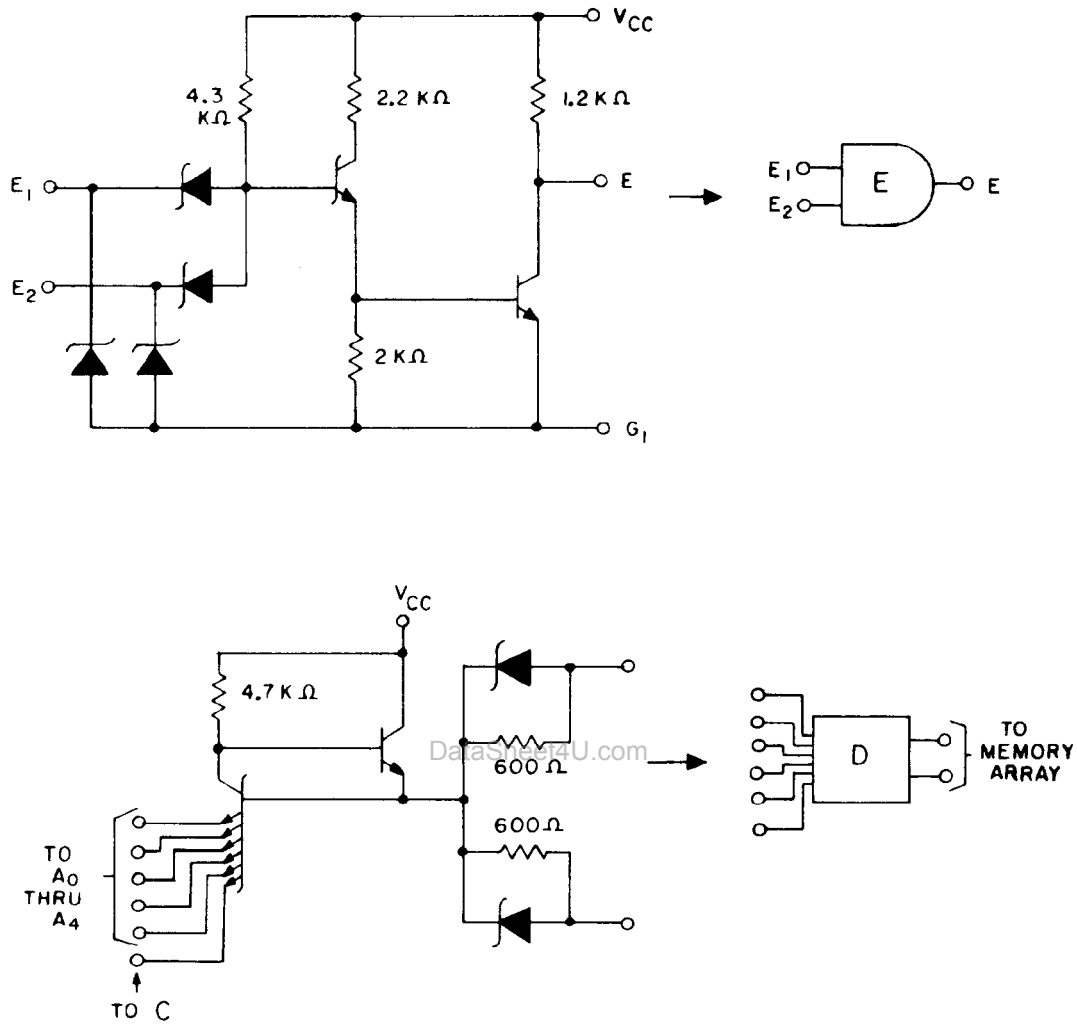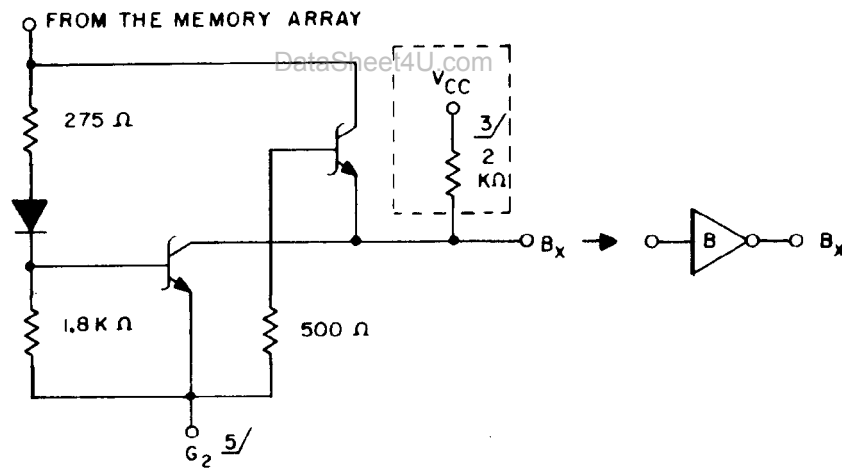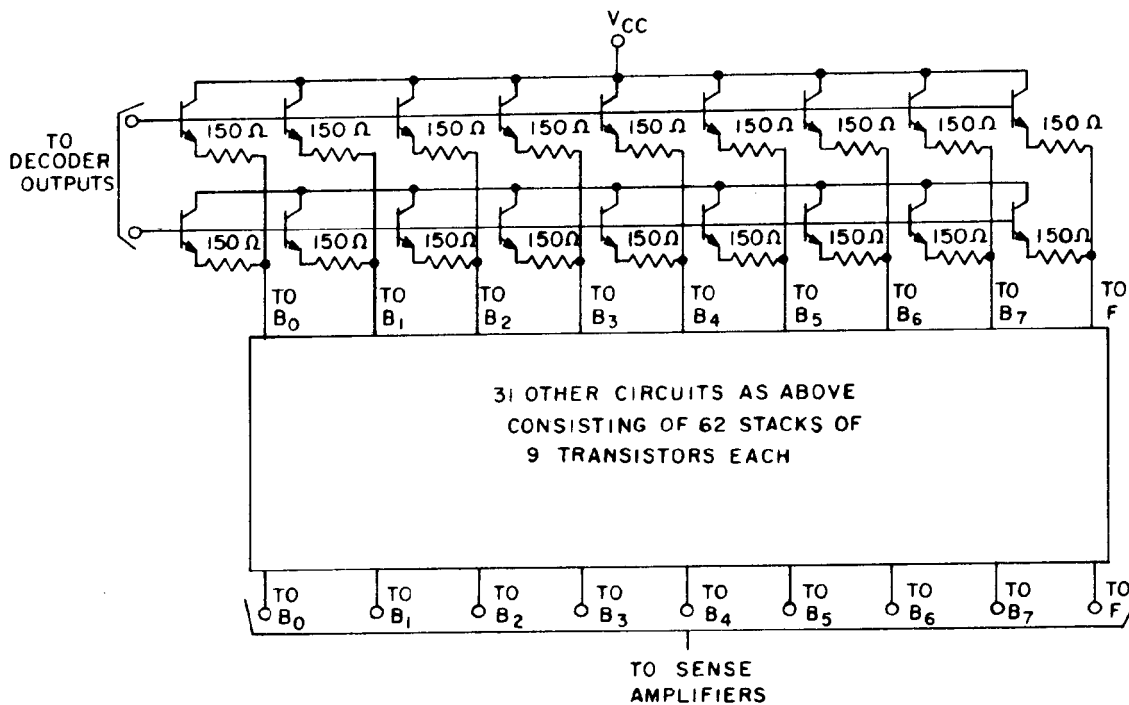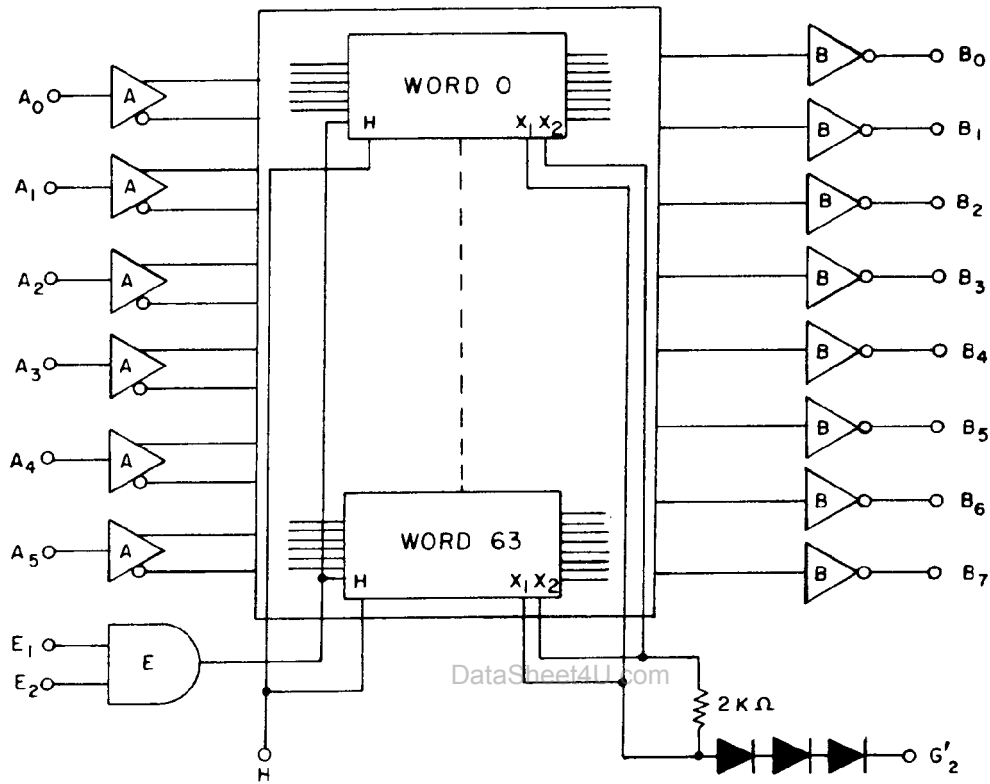
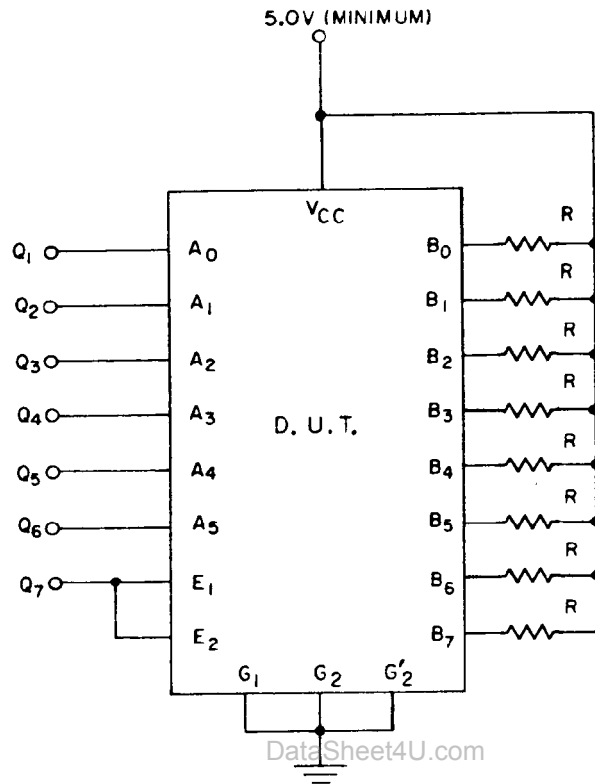FIGURE 4. Logic diagram and schematic circuit for device type 01, circuit A.
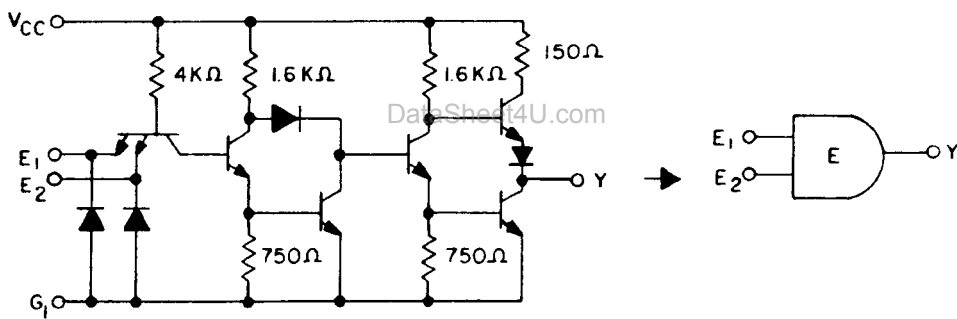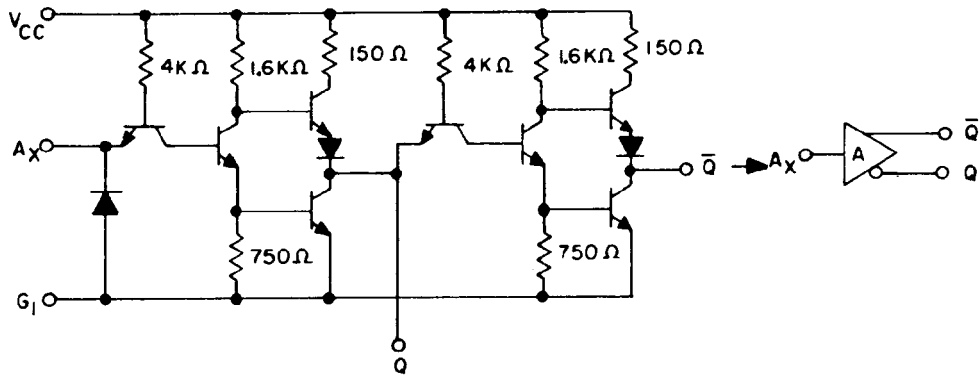
FIGURE 4. <u>Logic diagram and schematic circuit for device type 01, circuit A</u> - Continued.
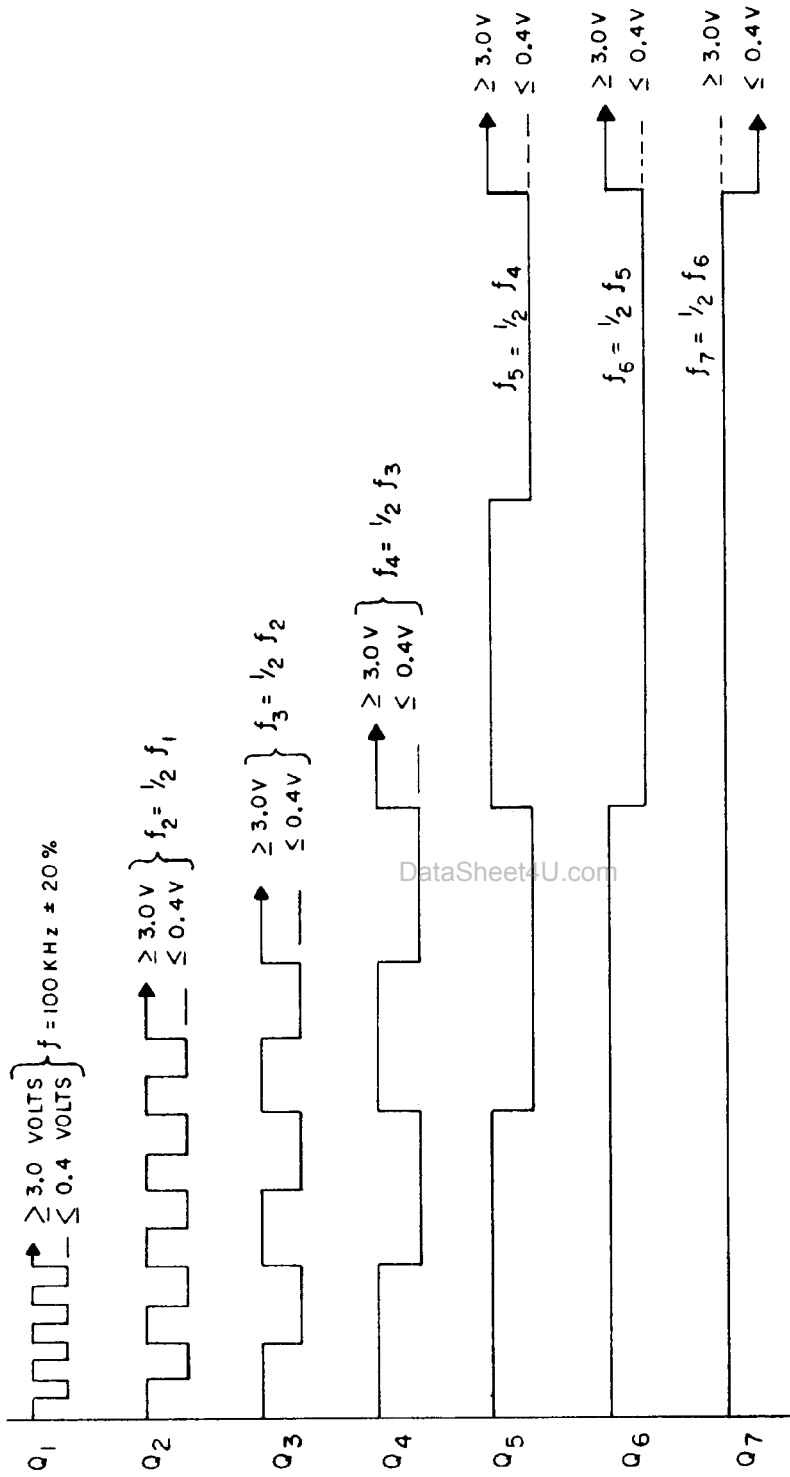
NOTE: All resistance values are nominal.

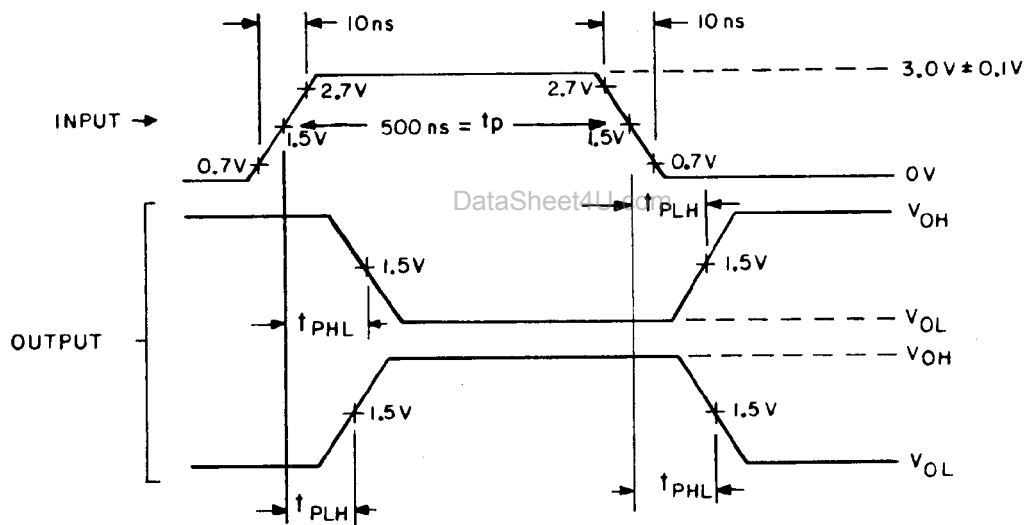FIGURE 4. Logic diagram and schematic circuit for device type 01, circuit A - Continued.
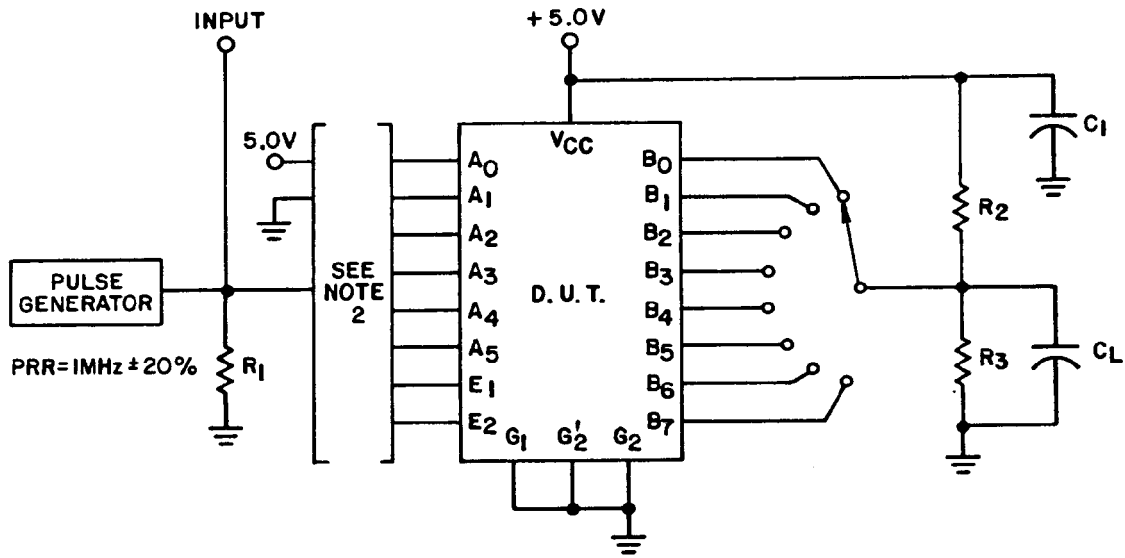
NOTE: R = 470Ω ± 5%. All bit outputs shall have separate identical loads.

FIGURE 5. Burn-in and steady state life test circuit for device types 01 and 02.
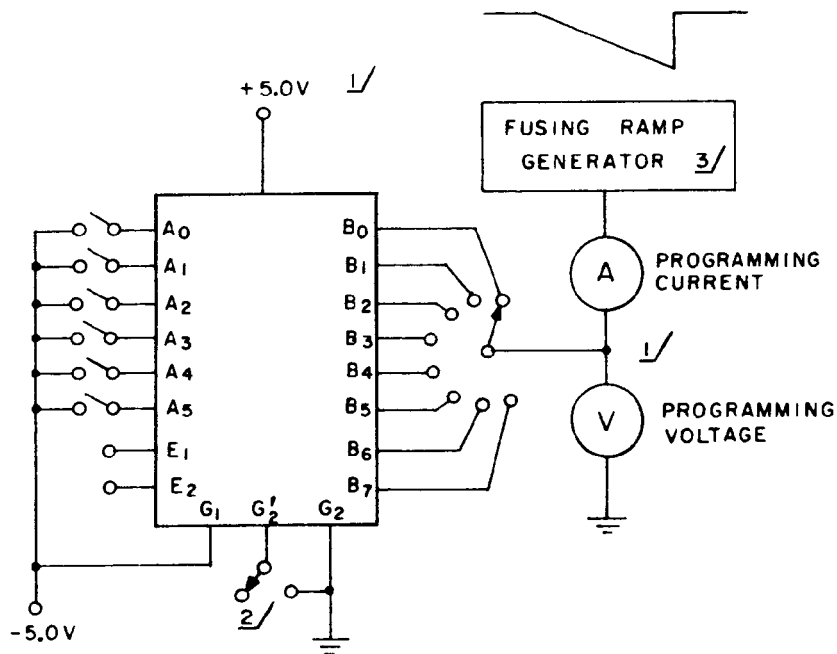
13

INPUT CONDITIONS

FIGURE 5. Burn-in and steady state life test circuit for device types 01 and 02 - Continued.

NOTES:
1. Pins 12 and 14 shall be left open.
2. Terminal conditions shall be as specified on table III.
3. C_1 = .05 µF ±10 percent; R_1 = 51Ω ±5 percent; R_2 = 470Ω ±5 percent; R_3 = 1 kΩ ±5 percent,
 C_L = 30 pF minimum including jig and probe capacitance.

FIGURE 6. Switching time test circuit.

NOTES:
1/ Connect -5.0V to G_1 before applying V_{CC} or programming voltage.
2/ For device type 01, circuit A, G_2' shall be open.
   For device types 01, circuit B, and 02, G_2' shall be 0V.
3/ Generator characteristics are defined in 4.6.

FIGURE 7a. Programming circuit.

+5.0V

1 KΩ ± 5%

+5.0V
0V
750 MS ±
50 MS

Q_1

10 KΩ
± 5%

Q_2

75Ω
± 5%

TO OUTPUTS
B_0 THRU B_7

CR1

-15.0V
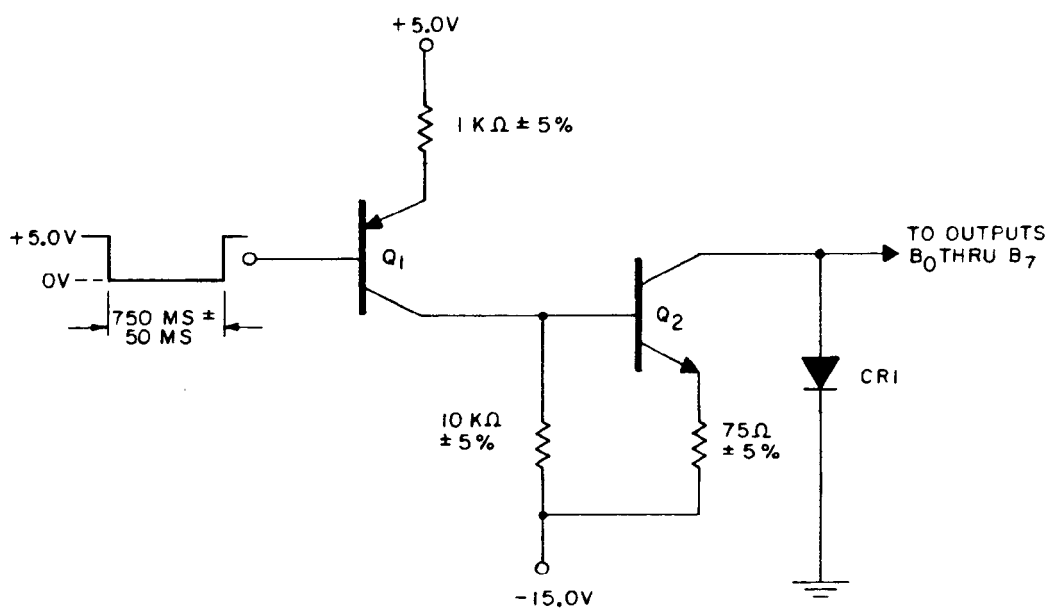
NOTES:
1. Q_1 = 2N2907 or equivalent.
2. Q_2 = 2N1613 or equivalent.
3. CR1 = 1N4573 or equivalent.

FIGURE 7b. Alternate high speed programming circuit.

TABLE III. Group A inspection for device type 01.

Terminal conditions: Outputs not designated are open or resistive coupled to GND or voltage; inputs not designated are high ≥2.0 V, low ≤0.8 v, or open.

Subgroup	Symbol	MIL-STD-883 method	Cases J,K,L	Test no.	1 NC	2 NC	3 A0	4 A1	5 A2	6 E1	7 E2	8 A3	9 A4	10 A5	11 G1	12	13 G2	14 F	15 B7	16 B6	17 B5	18 B4	19 B3	20 B2	21 B1	22 B0	23 Ḡ2	24 VCC	Measured terminal	Min	Max	Unit
1 1/ $T_C = 25°C$	V_{IC}	3009		1–8			-12 mA	-12 mA	-12 mA	-12 mA	-12 mA	-12 mA	-12 mA	-12 mA	GND		GND										GND	4.75 V	A0, A1, A2, A3, A4, A5, E1, E2		-1.5	V
	I_{IL}	3009		9–16			0.4 V	0.4 V	0.4 V	10.4 V / 5.25 V	10.4 V / 5.25 V	0.4 V	0.4 V	0.4 V														5.25 V	A0, A1, A2, A3, A4, A5, E1, E2	-0.2	-1.6	mA
	I_{IH1}	3010		17–24			2.4 V	2.4 V	2.4 V	2.4 V / GND	GND / 2.4 V	2.4 V	2.4 V	2.4 V															A0, A1, A2, A3, A4, A5, E1, E2		50	µA
	I_{IH2}			25–32			5.25 V	5.25 V	5.25 V	5.25 V / GND	GND / 5.25 V	5.25 V	5.25 V	5.25 V															A0, A1, A2, A3, A4, A5, E1, E2		100	µA
	I_{CEX1}			33–40						0.8 V	0.8 V / 0.8 V								2.8 V	2.8 V	2.8 V	2.8 V	2.8 V	2.8 V	2.8 V	2.6 V			B0, B1, B2, B3, B4, B5, B6, B7			µA
	I_{CEX2}			41–48															5.25 V	5.25 V	5.25 V	5.25 V	5.25 V	5.25 V	5.25 V	5.25 V			B0, B1, B2, B3, B4, B5, B6, B7		200	µA
	I_{CC}	3005		49			GND	GND	GND	GND	GND	GND	GND	GND	GND		GND											4.75 V	VCC		100	mA
	V_{OL}	3007		50–57			GND	GND	GND	2.0 V / 2.0 V	2.0 V / 2.0 V	GND	GND	GND	GND		GND		110 mA	110 mA	110 mA	110 mA	110 mA	110 mA	110 mA	110 mA			B0, B1, B2, B3, B4, B5, B6, B7		2/	V

See footnotes at end of device type 01.

TABLE III. Group A inspection for device type 01 - Continued.

Terminal conditions: Outputs not designated are open or resistive coupled to GND or voltage; inputs not designated are high ≥2.0 V, low ≤0.8 V, or open.

Subgroup	Symbol	MIL-STD-883-method	Cases J,K,L Test no.	1 NC	2 NC	3 A0	4 A1	5 A2	6 E1	7 E2	8 A3	9 A4	10 A5	11 G1	12 H	13 G2	14 F	15 B7	16 B6	17 B5	18 B4	19 B3	20 B2	21 B1	22 B0	23 G2	24 Vcc	Measured terminal	Test limits Min	Max	Unit
2 1/		Same tests, terminal conditions, and limits as for subgroup 1, except Tc = 125°C and VJC tests are omitted.														GND											GND	4.75 V			
3 1/		Same tests, terminal conditions, and limits as for subgroup 1, except Tc = -55°C and VJC tests are omitted.																													
7 3/4/ Tc = 25°C	Truth table test		58			B	B	B	A	A	B	B	B		H	GND		H	H	H	H	H	H	H	H	GND	4.75 V				

See footnotes at end of device type 01.

TABLE III. Group A inspection for device type 01 - Continued.

Terminal conditions: Outputs not designated are open or resistive coupled to GND or voltage; inputs not designated are high ≥ 2.0 V, low ≤ 0.8 V, or open.

Subgroup	Symbol	MIL-STD-883-method	Cases J,K,L Test no.	1 NC	2 NC	3 A0	4 A1	5 A2	6 E1	7 E2	8 A3	9 A4	10 A5	11 G1	12 H	13 G2	14 F	15 B7	16 B6	17 B5	18 B4	19 B3	20 B2	21 B1	22 B0	23 G2	24 VCC	Measured terminal	Test limits Min	Max	Unit
8 TC = +125°C and -55°C	Truth table test		122-185	Repeat subgroup 7, except TC = +125°C.																											
			186-249	Repeat subgroup 7, except TC = -55°C.																											
9 TC = 25°C	tPHL and tPLH	3003 (Fig. 6)	250			5/	5/	5/	5.0 V	IN	5/	5/	5/	GND		GND		OUT	OUT	OUT	OUT	OUT	OUT	OUT	OUT	GND	5.0 V	B0	25	85	ns
			251																									B1			
			252																									B2			
			253																									B3			
			254																									B4			
			255																									B5			
			256																									B6			
			257						IN	5.0 V								OUT	OUT	OUT	OUT	OUT	OUT	OUT	OUT			B7			
			258																									B0			
			259																									B1			
			260																									B2			
			261																									B3			
			262																									B4			
			263																									B5			
			264																									B6			
			265																									B7			
10				Same tests and terminal conditions as for subgroup 9, except TC = 125°C and the limits are 25 ns minimum and 140 ns maximum.																											
11				Same tests, terminal conditions, and limits as for subgroup 10, except TC = -55°C.																											

1/ Unprogrammed device conditions.

2/ VOL = 0.45 V for circuit A and 0.50 V for circuit B.

3/ Input voltages shall be: A = 2.0 V minimum; B = 0.8 V maximum.

4/ Output voltages shall be either:

   a. H = 2.4 V minimum and L = VOL (VOL = 0.45 V maximum for circuit A and 0.50 V maximum for circuit B) when using a high speed checker double comparator.

   b. H ≥ 1.0 V and L <1.0 V when using a high speed checker single comparator.

5/ Terminal conditions (GND or 5.0 V) shall be as specified on figure 6 or in the altered item drawing, as applicable, so that all outputs are at a low logic level.

TABLE III. Group A inspection for device type 02.

Terminal conditions: Outputs not designated are open or resistive coupled to GND or voltage; inputs not designated are high ≥2.0 V, low ≤0.8 V, or open.

Subgroup	Symbol	MIL-STD-883 method	Cases J,K,L Test no.	1 NC	2 NC	3 A0	4 A1	5 A2	6 E1	7 E2	8 A3	9 A4	10 A5	11 G1	12 H	13 G2	14 F	15 B7	16 B6	17 B5	18 B4	19 B3	20 B2	21 B1	22 B0	23 G2	24 VCC	Measured terminal	Min	Max	Unit
1 [1/] $T_C = 25°C$	V_{IC}		1–8			-12 mA	-12 mA	-12 mA	-12 mA	-12 mA	-12 mA	-12 mA	-12 mA	GND		GND										GND	4.75 V	A0, A1, A2, A3, A4, A5, E1, E2		-1.5	V
	I_{IL}	3009	9–16			0.4 V	0.4 V	0.4 V	0.4 V / 5.25 V	5.25 V / 0.4 V	0.4 V	0.4 V	0.4 V														5.25 V	A0, A1, A2, A3, A4, A5, E1, E2	-0.2	-1.6	mA
	I_{1H1}	3010	17–24			2.4 V	2.4 V	2.4 V	2.4 V / GND	GND / 2.4 V	2.4 V	2.4 V	2.4 V															A0, A1, A2, A3, A4, A5, E1, E2		80	µA
	I_{1H2}		25–32			5.25 V	5.25 V	5.25 V	5.25 V / GND	GND / 5.25 V	5.25 V	5.25 V	5.25 V															A0, A1, A2, A3, A4, A5, E1, E2		100	µA
	I_{CC}	3005	33			GND	GND	GND	GND	GND	GND	GND	GND															VCC			mA
	V_{OH}	3006	34–41						0.8 V	0.8 V								-.5 mA	-.5 mA	-.5 mA	-.5 mA	-.5 mA	-.5 mA	-.5 mA	-.5 mA		4.75 V	B0, B1, B2, B3, B4, B5, B6, B7	2.4		V
	V_{OL}	3007	42–49						2.0 V	2.0 V							10 mA	10 mA	10 mA	10 mA	10 mA	10 mA	10 mA	10 mA			B0, B1, B2, B3, B4, B5, B6, B7		0.50	V
	I_{OS}	3011	50–57						GND	GND						GND	GND	GND	GND	GND	GND	GND	GND	GND	GND	5.25 V	B0, B1, B2, B3, B4, B5, B6, B7	-1.5	-5.0	mA

See footnotes at end of device type 02.

TABLE III. Group A inspection for device type 02 - Continued.

Terminal conditions: Outputs not designated are open or resistive coupled to GND or voltage; inputs not designated are high ≥2.0 V, low ≤0.8 V, or open.

Subgroup	Symbol	MIL-STD-883-method	Cases J,K,L Test no.	1 NC	2 NC	3 A0	4 A1	5 A2	6 E1	7 E2	8 A3	9 A4	10 A5	11 G1	12 H	13 G2	14 F	15 B7	16 B6	17 B5	18 B4	19 B3	20 B2	21 B1	22 B0	23 G2	24 VCC	Measured terminal	Test limits Min	Max	Unit
2 1/				Same tests, terminal conditions, and limits as for subgroup 1, except T_C = 125°C and V_{IC} tests are omitted.																										
3 1/				Same tests, terminal conditions, and limits as for subgroup 1, except T_C = -55°C and V_{IC} tests are omitted.																										
7 2/3/ T_C = 25°C	Truth table test		58–121												GND	GND										GND	4.75 V			

See footnotes at end of device type 02.

TABLE III. Group A inspection for device type 02 - Continued.

Terminal conditions: Outputs not designated are open or resistive coupled to GND or voltage; inputs not designated are high ≥2.0 V, low <0.8 V, or open.

Subgroup	Symbol	MIL-STD-883-method	Cases I,J,K,L Test no.	1 NC	2 NC	3 A_0	4 A_1	5 A_2	6 E_1	7 E_2	8 A_3	9 A_4	10 A_5	11 G_1	12 H	13 G_2	14 F	15 B_7	16 B_6	17 B_5	18 B_4	19 B_3	20 B_2	21 B_1	22 B_0	23 G_2	24 V_{CC}	Measured terminal	Test limits Min	Test limits Max	Unit
8 T_C = 125°C and -55°C	Truth table test		122-185	Repeat subgroup 7, except T_C = +125°C.																											
			186-249	Repeat subgroup 7, except T_C = -55°C.																											
9 T_C = 25°C	t_{PHL} and t_{PLH}	3003 (Fig. 6)	250	4/		4/	4/	4/	5.0 V	IN	4/	4/	4/	GND	H	GND									OUT	GND	5.0 V	B_0	25	85	ns
			251																						OUT			B_1			
			252																					OUT				B_2			
			253																				OUT					B_3			
			254																			OUT						B_4			
			255																		OUT							B_5			
			256																	OUT								B_6			
			257																OUT									B_7			
			258						IN	5.0 V								OUT											B_0			
			259																						OUT			B_1			
			260																					OUT				B_2			
			261																				OUT					B_3			
			262																			OUT						B_4			
			263																		OUT							B_5			
			264																	OUT								B_6			
			265																OUT									B_7			
10				Same tests and terminal conditions as for subgroup 9, except T_C = 125°C and the limits are 25 ns minimum and 140 ns maximum.																											
11				Same tests, terminal conditions, and limits as for subgroup 10, except T_C = -55°C.																											

1/ Unprogrammed device conditions.

2/ Input voltages shall be: A = 2.0 V minimum; B = 0.8 V maximum.

3/ Output voltages shall be either:

   a. H = 2.4 V minimum and L = 0.5 V maximum when using a high speed checker double comparator.
   b. H ≥1.0 V and L <1.0 V when using a high speed checker single comparator.

4/ Terminal conditions (GND or 5.0 V) shall be as specified on figure 6 or in the altered item drawing, as applicable, so that all outputs are at a low logic level.

23

3.6 Marking. Marking shall be in accordance with MIL-M-38510. For programmed devices, the altered item drawing number shall be added to the marking by the programming activity. The JAN or "J" certification shall not be used.

3.7 Processing options. Since the PROM is an unprogrammed memory capable of being programmed by either the manufacturer or the user to result in a wide variety of ROM configurations, two processing options are provided for selection in the contract, using an altered item drawing.

3.7.1 Unprogrammed PROM delivered to the user. All testing shall be verified through group A testing as defined in 3.2.2.1 and tables II and III. It is recommended that users perform subgroups 7 and 9 after programming to verify the specific program configuration.

3.7.2 Manufacturer-programmed PROM delivered to the user. All testing requirements and quality assurance provisions herein, including the requirements of the altered item drawing, shall be satisfied by the manufacturer prior to delivery.

3.8 Microcircuit group assignment. The devices covered by this specification shall be in microcircuit group number 14 (see MIL-M-38510, appendix E).

3.9 Manufacturer eligibility. To be eligible to supply microcircuits to this specification a manufacturer shall have a manufacturer certification in accordance with MIL-M-38510 for at least one line, not necessarily the line producing the device type described herein.

3.10 Certification. Certification in accordance with MIL-M-38510 is not required for this device.

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-M-38510 and methods 5005 and 5007, as applicable, of MIL-STD-883, except as modified herein.

4.2 Screening. Screening shall be in accordance with method 5004 of MIL-STD-883, and shall be conducted on all devices prior to quality conformance inspection. The following additional criteria shall apply:

    a. Burn-in test (method 1015 of MIL-STD-883); test condition D or E, using the circuit shown on figure 5 or equivalent.

    b. Interim and final electrical test parameters shall be as specified in table II, except interim electrical test parameters prior to burn-in is optional at the discretion of the manufacturer.

    c. The percent defective allowable (PDA) shall be as specified in MIL-M-38510.

    d. Class B devices processed to an altered item drawing may be programmed either before or after burn-in at the manufacturer's discretion. The required electrical testing shall include, as a minimum, the final electrical tests for programmed devices as specified in table II herein.

4.3 Qualification inspection. Qualification inspection is not required.

4.4 Quality conformance inspection. Quality conformance inspection shall be in accordance with MIL-M-38510. Inspections to be performed shall be those specified in method 5005 of MIL-STD-883 and herein for groups A, B, C, and D inspections (see 4.4.1 through 4.4.4). Generic test data may be used to satisfy the requirements for group C and D inspections (see 6.7).

4.4.1 Group A inspection. Group A inspection shall be in accordance with table I of method 5005 of MIL-STD-883 and as follows:

    a. Tests shall be as specified in table II herein.

    b. Subgroups 4, 5, and 6 shall be omitted.

c. Devices selected for testing in subgroups 9, 10, and 11 shall be programmed in accordance with 3.2.2.

d. A programmability test shall be performed when programming the sample (12 devices) used in subgroups 9, 10, and 11 (see 3.2.2.1). If more than two devices fail to program, the lot shall be rejected. If an additional sample is used (24 total devices), the lot shall be rejected if more than 4 devices fail to program.

4.4.2 <u>Group B inspection</u>. Group B inspection shall be in accordance with table II of method 5005 of MIL-STD-883.

4.4.3 <u>Group C inspection</u>. Group C inspection shall be in accordance with table III of method 5005 of MIL-STD-883 and as follows:

a. End-point electrical parameters shall be as specified in table II herein.

b. Steady state life test (method 1005 of MIL-STD-883) conditions:

(1) Test condition D or E, using the circuit shown on figure 5 or equivalent.

(2) $T_A = 125°C$ minimum.

(3) Test duration - 1,000 hours, except as permitted by appendix B of MIL-M-38510 and method 1005 of MIL-STD-883.

c. For quality conformance inspection, the programmability sample (see 4.4.1d) shall be included in the subgroup 1 tests.

4.4.4 <u>Group D inspection</u>. Group D inspection shall be in accordance with table IV of method 5005 of MIL-STD-883. End-point electrical parameters shall be as specified in table II herein.

4.5 <u>Methods of inspection</u>. Methods of inspection shall be as specified in the appropriate tables and as follows:

4.5.1 <u>Voltage and current</u>. All voltages given are referenced to the microcircuit ground terminal. Currents given are conventional and positive when flowing into the referenced terminal.

4.6 <u>Programming</u>. Using the test conditions of table IV, the following procedure shall be used for programming the device:

a. Connect the device as shown on figure 7a, using the fusing generator of figure 7a or the alternate circuit of figure 7b. The circuit shown on figure 7b can be used in more automated programming systems. This circuit generates a current pulse which is at the proper voltage and current levels for fast reliable programming. The input programming pulse width shall be 750 ±50 milliseconds. The number of attempts to program a given bit shall be as specified in table IV.

b. To address a particular word in the memory, set the input switches to the binary equivalent of that word, where a logical low level is -5.0 V and a logical high level is an open circuit. (Do not return to supply.) All output bits (B_0, B_1,. . . B_7 of this word are not available for programming.

c. With the output current limited (as specified in table IV), apply a negative going current pulse to the pin associated with the first bit to be changed from a logical low level to a logical high level. This is most easily accomplished by connecting the negative terminal of a variable power supply output pin and manually increasing the voltage to approximately 6.0 volts.

d. Skipping any bit which is to remain a logical low level, repeat 4.6c for each logical low level in the word being addressed. Not more than one bit shall be programmed at a time.

25

e. Set the next input address and repeat 4.6c and d. This procedure is repeated for each input address for which a specific output word pattern is desired. Note that all addresses do not have to be programmed at the same time, nor do all output bits for a given address. A logical low level can always be changed to a logical high level, simply by repeating 4.6b and c. A logical low level, once programmed to a logical high level, cannot be reprogrammed.

TABLE IV. Programming specifications.

Parameter		Value
Address input voltage	High logic level	Open circuit 1/
	Low logic level	-5.0 V
Power supply voltage		+5.0 V +5%, -0%
G_1 voltage 2/		-5.0 V
G_2 voltage		0 V
G'_2 voltage	Device type 01 (circuit A)	Open
	Device types 01 (circuit B) and 02	0 V
Maximum programming voltage		-7.0 V
Maximum programming current		100 mA
Maximum number of attempts to program a given bit		2
Maximum case temperature during programming		75°C

1/ Open collector TTL gates meet this requirement.

2/ G_1 must be connected to -5.0 V prior to applying V_{CC} or programming voltage.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-M-38510.

6. NOTES

6.1 Intended use. Microcircuits conforming to this specification are intended for original equipment design applications and logistic support of existing equipment.

6.2 Ordering data. The acquisition document should specify the following:

a. Complete part number (see 1.2).

b. Requirements for delivery of one copy of the quality conformance inspection data pertinent to the device inspection lot to be supplied with each shipment by the device manufacturer, if applicable.

c. Requirements for certificate of compliance, if applicable.

d. Requirements for notification of change of product or process to the contracting activity in addition to notification to the qualifying activity, if applicable.

e. Requirements for failure analysis (including required test condition of method 5003 of MIL-STD-883), corrective action, and reporting of results, if applicable.

f. Requirements for product assurance options.

g. Requirements for special carriers, lead lengths, or lead forming, if applicable. These requirements shall not affect the part number. Unless otherwise specified, these requirements will not apply to direct purchase by or direct shipment to the Government.

h. Requirements for programming the device, including processing option.

6.4 <u>Abbreviations, symbols, and definitions</u>. The abbreviations, symbols, and definitions used herein are defined in MIL-M-38510, MIL-STD-1331, and as follows:

GND - - - - - - - - - - - - - Electrical ground (common terminal).
V_{IN} - - - - - - - - - - - - - Voltage level at an input terminal.
V_{IC} - - - - - - - - - - - - - Input clamp voltage.
I_{IN} - - - - - - - - - - - - - Current flowing into an input terminal.

6.5 <u>Logistic support</u>. Lead materials and finishes (see 3.3) are interchangeable. Unless otherwise specified, microcircuits acquired for Government logistic support will be acquired to device class B (see 1.2.2) and lead material and finish C (see 3.3). Longer lead lengths and lead forming shall not affect the part number. It is intended that spare devices for logistic support be acquired in the unprogrammed condition (see 3.7.1) and programmed by the maintenance activity, except where use quantities for devices with a specific program or pattern justify stocking of preprogrammed devices.

6.6 <u>Substitutability</u>. The cross-reference information below is presented for the convenience of users. Microcircuits covered by this specification will functionally replace the listed generic-industry type. Generic-industry microcircuit types may not have equivalent operational performance characteristics across military temperature ranges or reliability factors equivalent to MIL-M-38510 device types and may have slight physical variations in relation to case size. The presence of this information shall not be deemed as permitting substitution of generic-industry types for MIL-M-38510 types or as a waiver of any of the provisions of MIL-M-38510.

Military device type	Generic-industry type
01	HPROM- 0512, MCM 5303
02	MCM 5304

6.7 <u>Generic test data</u>. Generic test data may be used to satisfy the requirements of 4.4.3. Group C generic test data shall be on date codes no more than one year old and on a die in the same microcircuit group (see appendix E of MIL-M-38510) with the same material, design and process from the same plant as the die represented. Group D (see 4.4.4) generic data shall be on date codes no more than one year old and on the same package type (see terms, definitions, and symbols of MIL-M-38510) and from the same plant as the package represented. The vendor is required to retain generic data for a period of not less than 36 months from the date of shipment.

6.8 <u>Ordering guidance</u>. Since the qualification and certification requirements have been removed from the specification, orders may be placed immediately.

6.9 <u>Changes from previous issue</u>. Asterisks are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodians:
  Army - ER
  Navy - EC
  Air Force - 17

Review activities:
  Army - AR, MI
  Navy - OS, SH
  Air Force - 11, 19, 85, 99
  DLA - ES

User activities:
  Army - SM
  Navy - AS, MC,

Preparing activity:
  Air Force - 17

Agent:
  DLA - ES

(Project 5962-0880)

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