

REVISIONS																			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED																
A	Add figure 4. Change transition times and propagation delay times in table I. Change terminal connections. Add subgroup 8 in table II. Change vendor similar part number for case outline 2. Editorial changes throughout. Change in I _{IL} . Technical changes in 1.4 and table I.	89 FEB 24	<i>M. A. Lee</i>																

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REV STATUS OF SHEETS	REV	A	A	A	A	A	A	A	A		A	A	A	A						
	SHEET	1	2	3	4	5	6	7	8	9	10	11	12	13						

PMIC N/A STANDARDIZED MILITARY DRAWING THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE AMSC N/A	PREPARED BY <i>Monica Polking</i> CHECKED BY <i>Ray Monnin</i> APPROVED BY <i>[Signature]</i> DRAWING APPROVAL DATE 22 OCTOBER 1987 REVISION LEVEL A	DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444 MICROCIRCUIT, DIGITAL, ECL, THREE-INPUT, THREE-OUTPUT OR GATE, MONOLITHIC SILICON <table style="width: 100%;"> <tr> <td style="width: 15%;">SIZE A</td> <td style="width: 35%;">CAGE CODE 67268</td> <td style="width: 50%;">5962-87541</td> </tr> <tr> <td colspan="3" style="text-align: center;">SHEET 1 OF 13</td> </tr> </table>	SIZE A	CAGE CODE 67268	5962-87541	SHEET 1 OF 13		
SIZE A	CAGE CODE 67268	5962-87541						
SHEET 1 OF 13								

 DESC FORM 193
 SEP 87

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5962-E1103

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

1. SCOPE

1.1 Scope. This drawing describes device requirements for class B microcircuits in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices".

1.2 Part number. The complete part number shall be as shown in the following example:

5962-87541	01	E	X
Drawing number	Device type (1.2.1)	Case outline (1.2.2)	Lead finish per MIL-M-38510

1.2.1 Device type. The device type shall identify the circuit function as follows:

Device type	Generic number	Circuit function
01	10H610	Dual three-input, three-output OR gate

1.2.2 Case outlines. The case outlines shall be as designated in appendix C of MIL-M-38510, and as follows:

Outline letter	Case outline
E	D-2 (16-lead, .840" x .310" x .200"), dual-in-line package
F	F-5 (16-lead, .440" x .285" x .085"), flat package
2	C-2 (20-terminal, .358" x .358" x .100"), square chip carrier package

1.3 Absolute maximum ratings.

Supply voltage range (V_{EE})	-8.0 V dc to 0.0 V dc
Input voltage range	-5.2 V dc to 0.0 V dc
Storage temperature range	-65°C to +165°C
Lead temperature (soldering 10 seconds)	+300°C
Junction temperature (T_J)	+165°C
Maximum power dissipation (P_D)	275 mW
Thermal resistance, junction-to-case (θ_{JC})	See MIL-M-38510, appendix C

1.4 Recommended operating conditions.

Supply voltage range (V_{EE})	-5.46 V dc minimum to -4.94 V dc maximum
Supply voltage range (V_{CC})	-0.02 V dc to +0.02 V dc or 1.98 V dc to 2.02 V dc
Ambient operating temperature range (T_A)	-55°C to +125°C
Minimum high level input voltage (V_{IH}):	
$T_A = +25^\circ\text{C}$	-0.780 V dc
$T_A = +125^\circ\text{C}$	-0.650 V dc
$T_A = -55^\circ\text{C}$	-0.840 V dc
Maximum low level input voltage (V_{IL})	-1.950 V dc

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A	5962-87541	
		REVISION LEVEL A	SHEET 2

2. APPLICABLE DOCUMENTS

2.1 Government specification and standard. 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 drawing 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 activity.)

2.2 Order of precedence. In the event of a conflict between the text of this drawing and the references cited herein, the text of this drawing shall take precedence.

3. REQUIREMENTS

3.1 Item requirements. The individual item requirements shall be in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices" and as specified herein.

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

3.2.1 Terminal connections. The terminal connections shall be as specified on figure 1.

3.2.2 Truth table. The truth table shall be as specified on figure 2.

3.2.3 Logic diagrams. The logic diagrams shall be as specified on figure 3.

3.2.4 Test circuit and switching waveforms. The test circuit and switching waveforms shall be as specified on figure 4.

3.2.5 Case outlines. The case outlines shall be in accordance with 1.2.2 herein.

3.3 Electrical performance characteristics. Unless otherwise specified, the electrical performance characteristics are as specified in table I and apply over the full ambient operating temperature range.

3.4 Marking. Marking shall be in accordance with MIL-STD-883 (see 3.1 herein). The part shall be marked with the part number listed in 1.2 herein. In addition, the manufacturer's part number may also be marked as listed in 6.4 herein.

3.5 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to be listed as an approved source of supply in 6.4. The certificate of compliance submitted to DESC-ECS prior to listing as an approved source of supply shall state that the manufacturer's product meets the requirements of MIL-STD-883 (see 3.1 herein) and the requirements herein.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-87541
		REVISION LEVEL A	SHEET 3

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions -55°C < T _A < +125°C unless otherwise specified	Group A subgroups	Limits		Unit		
				Min	Max			
Cases E, F, and 2		Quiescent conditions <u>1/</u>						
High level output voltage	V _{OH}	Outputs terminated through 100Ω to -2 V	V _{IH}	V _{IL}				
			-0.780	-1.950	1	-1.010	-0.780	V
			-0.650	-1.950	2	-0.860	-0.650	
			-0.840	-1.950	3	-1.060	-0.840	
Low level output voltage	V _{OL}	V _{CC} = 0.0 V V _{EE} = -5.2 V <u>2/</u>	-0.780	-1.950	1	-1.950	-1.580	V
			-0.650	-1.950	2	-1.950	-1.565	
			-0.840	-1.950	3	-1.950	-1.650	
High level threshold output voltage	V _{OHA}		-1.110	-1.480	1	-1.010	-0.780	V
			-0.960	-1.465	2	-0.860	-0.650	
			-1.160	-1.550	3	-1.060	-0.840	
Low level threshold output voltage	V _{OLA}		-1.110	-1.480	1	-1.950	-1.580	V
			-0.960	-1.465	2	-1.950	-1.565	
			-1.160	-1.550	3	-1.950	-1.650	
Power supply drain current <u>3/</u>	I _{EE}	V _{EE} = -5.46 V, V _{CC} = 0.0 V V _{IH} = -0.780 at +25°C -0.650 at +125°C -0.840 at -55°C			1 2, 3	-38 -42		mA
High level input current	I _{IH}				1, 2 3		450 720	μA
Low level input current	I _{IL}	V _{EE} = -4.94 V V _{IL} = -1.950 V V _{CC} = 0.0 V <u>3/</u>			1, 3 2	0.5 0.3		μA
Functional tests		See 4.3.1c			7, 8			

See footnotes at end of table.

**STANDARDIZED
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DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

SIZE
A

5962-87541

REVISION LEVEL

A

SHEET

4

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C ≤ T _A ≤ +125°C unless otherwise specified	Group A subgroups	Limits		Unit		
				Min	Max			
Cases E and F		DC rapid test conditions 4/						
High level output voltage	V _{OH}	Outputs terminated through 100Ω to -2 V V _{CC} = 0.0 V V _{EE} = -5.2 V 2/	V _{IH}	V _{IL}				
			-0.792	-1.950	1	-1.021	-0.792	V
			-0.663	-1.950	2	-0.872	-0.663	
-0.853	-1.950		3	-1.072	-0.853			
Low level output voltage	V _{OL}		-0.792	-1.950	1	-1.950	-1.584	V
			-0.663	-1.950	2	-1.950	-1.569	
			-0.853	-1.950	3	-1.950	-1.654	
High level threshold output voltage	V _{OHA}		-1.121	-1.484	1	-1.021	-0.792	V
			-0.972	-1.469	2	-0.872	-0.663	
			-1.172	-1.554	3	-1.072	-0.853	
Low level threshold output voltage	V _{OLA}		-1.121	-1.484	1	-1.950	-1.584	V
			-0.972	-1.469	2	-1.950	-1.569	
			-1.172	-1.554	3	-1.950	-1.654	
Power supply drain current 3/	I _{EE}		V _{EE} = -5.46 V, V _{CC} = 0.0 V V _{IH} = -0.792 at +25°C -0.663 at +125°C -0.853 at -55°C	1 2, 3	-37 -41		mA	
High level input current	I _{IH}			1, 2 3		435 705	μA	
Low level input current	I _{IL}		V _{EE} = -4.94 V, V _{CC} = 0.0 V V _{IL} = -1.950 V 3/	1, 3 2	0.5 0.3		μA	
Functional tests			See 4.3.1c	7, 8				

See footnotes at end of table.

**STANDARDIZED
MILITARY DRAWING**
DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

SIZE
A

5962-87541

REVISION LEVEL

A

SHEET

5

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C < T _A < +125°C unless otherwise specified	Group A subgroups	Limits		Unit		
				Min	Max			
Case 2 DC rapid test conditions 4/								
High level output voltage	V _{OH}	Outputs terminated through 100Ω to -2 V V _{CC} = 0.0 V V _{EE} = -5.2 V 2/	V _{IH}	V _{IL}				
Low level output voltage	V _{OL}		-0.800	-1.950	1	-1.028	-0.800	V
			-0.671	-1.950	2	-0.880	-0.671	
			-0.861	-1.950	3	-1.080	-0.861	
High level threshold output voltage	V _{OHA}		-0.800	-1.950	1	-1.950	-1.586	V
			-0.671	-1.950	2	-1.950	-1.572	
			-0.861	-1.950	3	-1.950	-1.657	
Low level threshold output voltage	V _{OLA}		-1.128	-1.486	1	-1.028	-0.800	V
			-0.980	-1.472	2	-0.880	-0.671	
			-1.180	-1.557	3	-1.080	-0.861	
Power supply drain current 3/	I _{EE}		-1.128	-1.486	1	-1.950	-1.586	V
			-0.980	-1.472	2	-1.950	-1.572	
		-1.180	-1.557	3	-1.950	-1.657		
High level input current	I _{IH}	V _{EE} = -5.46 V, V _{CC} = 0.0 V V _{IH} = -0.800 at +25°C -0.671 at +125°C -0.861 at -55°C	1 2, 3	-37 -41			mA	
Low level input current	I _{IL}	V _{EE} = -4.94 V, V _{CC} = 0.0 V V _{IL} = -1.950 V 3/	1, 3 2	0.5 0.3	435 705		μA	
Functional tests		See 4.3.1c	7, 8					

See footnotes at end of table.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A	5962-87541	
		REVISION LEVEL A	SHEET 6

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C < T _A < +125°C unless otherwise specified	Group A subgroups	Limits		Unit
				Min	Max	
Cases E, F, and 2		AC test conditions				
Transition time	t _{TLH} t _{THL}	V _{EE} = -2.94 V V _{CC} = 2.0 V C _L < 5 pF ±10% Load all outputs through 100Ω to ground See figure 4	9	0.50	1.80	ns
			10	0.50	1.90	
			11	0.50	1.75	
Propagation delay time, A, B to Y	t _{PLH}		9	0.40	1.65	ns
			10	0.40	1.90	
			11	0.40	1.85	
	t _{PHL}		9	0.40	1.70	ns
			10	0.40	1.95	
			11	0.40	1.60	

1/ The quiescent limits are determined after a device has reached thermal equilibrium. This is defined as the reading taken with the device in a socket with > 500 LFPM of +25°C, +125°C or -55°C (as applicable) air blowing on the unit in a transverse direction with power applied for at least 4 minutes before the reading is taken. This method was used for theoretical limit establishment only. All devices shall be tested to the delta V (rapid test) conditions specified herein. The rapid test method is an equivalent method of testing quiescent conditions.

2/ The high and low level output current varies with temperature, and shall be calculated using the following formulas:

$$I_{OH} = (V_{OH} - 2 \text{ V})/100\Omega$$

$$I_{OL} = (V_{OL} - 2 \text{ V})/100\Omega$$

3/ The I_{EE} and I_{IL} limits, although specified in the minimum column, shall not be exceeded in magnitude as a maximum value.

4/ The dc rapid test forcing functions and limits are used for all dc testing. These limits are determined for each device type based on the power dissipation and package type. The rapid test (delta V) limits and forcing functions are skewed allowing rapid testing to be performed at standard temperatures without the addition of delta T's.

3.6 Certificate of conformance. A certificate of conformance as required in MIL-STD-883 (see 3.1 herein) shall be provided with each lot of microcircuits delivered to this drawing.

3.7 Notification of change. Notification of change to DESC-ECS shall be required in accordance with MIL-STD-883 (see 3.1 herein).

3.8 Verification and review. DESC, DESC's agent, and the acquiring activity retain the option to review the manufacturer's facility and applicable required documentation. Offshore documentation shall be made available onshore at the option of the reviewer.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A			5962-87541
		REVISION LEVEL A	SHEET 7	

DESC FORM 193A
SEP 87

★ U. S. GOVERNMENT PRINTING OFFICE: 1988-550-547

Case outlines	E	F	2
Terminal number	Terminal symbol		
1	V _{CC1}	Y ₅	NC
2	Y ₁	Y ₆	V _{CC1}
3	Y ₂	NC	Y ₁
4	Y ₃	V _{CC2}	Y ₂
5	A ₁	V _{CC1}	Y ₃
6	A ₂	Y ₁	NC
7	A ₃	Y ₂	A ₁
8	V _{EE}	Y ₃	A ₂
9	B ₁	A ₁	A ₃
10	B ₂	A ₂	V _{EE}
11	B ₃	A ₃	NC
12	Y ₄	V _{EE}	B ₁
13	Y ₅	B ₁	B ₂
14	Y ₆	B ₂	B ₃
15	NC	B ₃	Y ₄
16	V _{CC2}	Y ₄	NC
17	---	---	Y ₅
18	---	---	Y ₆
19	---	---	NC
20	---	---	V _{CC2}

NC = No connection

FIGURE 1. Terminal connections.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A	5962-87541	
		REVISION LEVEL A	SHEET 8

Inputs			Outputs		
A ₁ /B ₁	A ₂ /B ₂	A ₃ /B ₃	Y ₁ /Y ₄	Y ₂ /Y ₅	Y ₃ /Y ₆
L	L	L	L	L	L
L	L	H	H	H	H
L	H	L	H	H	H
L	H	H	H	H	H
H	L	L	H	H	H
H	L	H	H	H	H
H	H	L	H	H	H
H	H	H	H	H	H

FIGURE 2. Truth table.

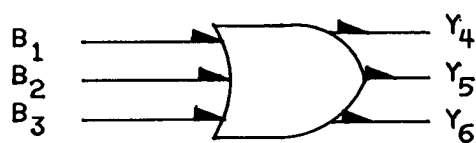
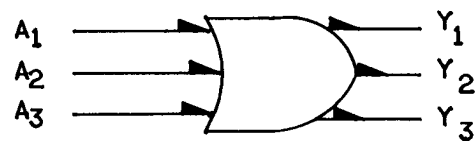
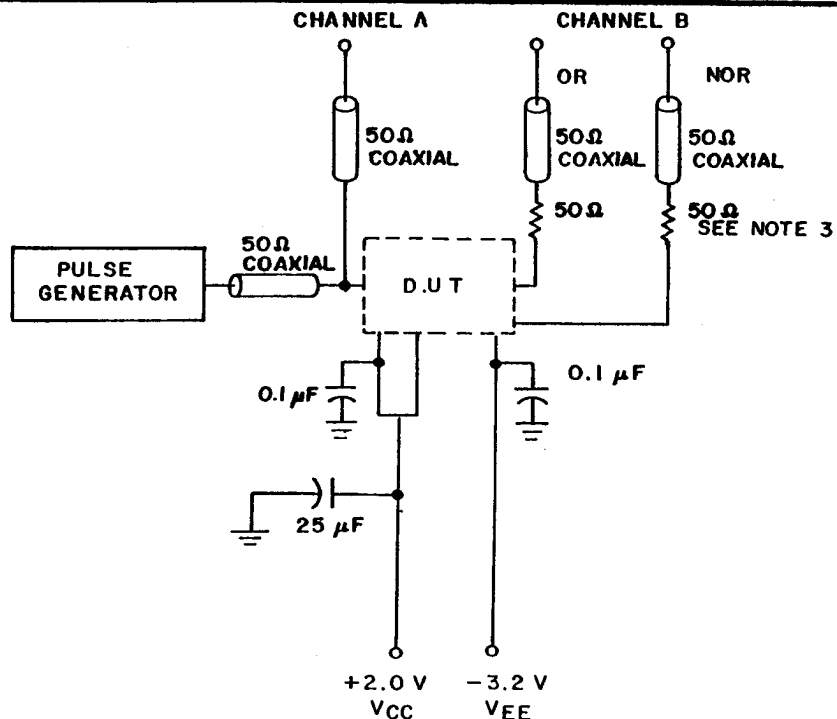


FIGURE 3. Logic diagrams.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-87541
		REVISION LEVEL	SHEET 9

DESC FORM 193A
SEP 87

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NOTES:

1. Pulse generator characteristics:
 $PRR = 1 \text{ MHz}$, $t_{THL} = t_{TLH} = 1.0 \pm 0.2 \text{ ns}$ (20% to 80%),
duty cycle = 50%.
2. All other outputs are loaded through 50Ω to GND.
3. The 50Ω resistor in series with the 50Ω coaxial constitutes the 100Ω load.

FIGURE 4. Test circuit and switching waveforms.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-87541
		REVISION LEVEL A	SHEET 10

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with section 4 of MIL-M-38510 to the extent specified in MIL-STD-883 (see 3.1 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.

(1) Test condition A, B, C, or D using the circuit submitted with the certificate of compliance (see 3.5 herein).

(2) $T_A = +125^{\circ}\text{C}$, minimum.

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

4.3 Quality conformance inspection. Quality conformance inspection shall be in accordance with method 5005 of MIL-STD-883 including groups A, B, C, and D inspections. The following additional criteria shall apply.

4.3.1 Group A inspection.

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

b. Subgroups 4, 5, and 6 in table I, method 5005 of MIL-STD-883 shall be omitted.

c. Subgroups 7 and 8 tests shall verify the truth table as specified on figure 2.

4.3.2 Groups C and D inspections.

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

b. Steady-state life test conditions, method 1005 of MIL-STD-883.

(1) Test condition A, B, C, or D using the circuit submitted with the certificate of compliance (see 3.5 herein).

(2) $T_A = +125^{\circ}\text{C}$, minimum.

(3) Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

STANDARDIZED MILITARY DRAWING

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

SIZE
A

5962-87541

REVISION LEVEL

A

SHEET

11

TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (per method 5005, table I)
Interim electrical parameters (method 5004)	1
Final electrical test parameters (method 5004)	1*, 2, 3, 7*, 8, 9
Group A test requirements (method 5005)	1, 2, 3, 7, 8, 9, 10, 11
Groups C and D end-point electrical parameters (method 5005)	1, 2, 3

* PDA applies to subgroups 1 and 7.

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 drawing are intended for use when military specifications do not exist and qualified military devices that will perform the required function are not available for OEM application. When a military specification exists and the product covered by this drawing has been qualified for listing on QPL-38510, the device specified herein will be inactivated and will not be used for new design. The QPL-38510 product shall be the preferred item for all applications.

6.2 Replaceability. Microcircuits covered by this drawing will replace the same generic device covered by a contractor-prepared specification or drawing.

6.3 Comments. Comments on this drawing should be directed to DESC-ECS, Dayton, Ohio 45444, or telephone 513-296-5375.

STANDARDIZED MILITARY DRAWING

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

SIZE
A

5962-87541

REVISION LEVEL

A

SHEET

12

6.4 Approved source of supply. An approved source of supply is listed herein. Additional sources will be added as they become available. The vendor listed herein has agreed to this drawing and a certificate of compliance (see 3.5 herein) has been submitted to DESC-ECS.

Military drawing part number	Vendor CAGE number	Vendor similar part number <u>1/</u>
5962-8754101EX	04713	10H610/BEAJC
5962-8754101FX	04713	10H610/BFAJC
5962-87541012X	04713	10H610M/B2AJC

1/ Caution. Do not use this number for item acquisition. Items acquired to this number may not satisfy the performance requirements of this drawing.

Vendor CAGE
number

04713

Vendor name
and address

Motorola, Incorporated
7402 South Price Road
Tempe, AZ 85283

**STANDARDIZED
MILITARY DRAWING**

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

SIZE
A

5962-87541

REVISION LEVEL

A

SHEET

13