REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED

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

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

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DRAWING APPROVAL DATE
92-08-12

REVISION LEVEL

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

MICROCIRCUIT, MEMORY, DIGITAL, CMOS, ONE TIME PROGRAMMABLE, ASYNCHRONOUS PROGRAMMABLE LOGIC DEVICE, MONOLITHIC SILICON

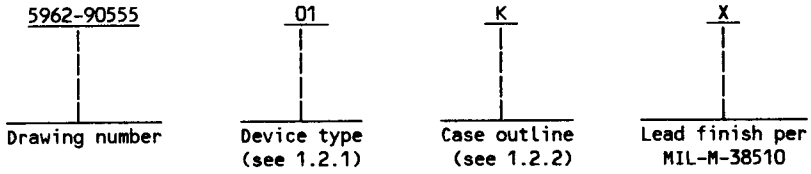
SIZE	CAGE CODE	5962-90555
A	67268	

SHEET 1

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 or Identifying Number (PIN). The complete PIN shall be as shown in the following example:



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

Device type	Generic number 1/	Circuit function	t_{PD}
01		Asynchronous PLD	35 ns
02		Asynchronous PLD	25 ns
03		Asynchronous PLD	20 ns

1.2.2 Case outline(s). The case outline(s) shall be as designated in MIL-STD-1835 and as follows:

Outline letter	Descriptive designator	Terminals	Package style
K	GDFP2-F24 or CDFP3-F24	24	Flat pack
L	GDIP3-T24 or CDIP4-T24	24	Dual-in-line
3, X	CQCC1-N28	28	Square leadless chip carrier

1.3 Absolute maximum ratings. 2/

Supply voltage to ground potential	-0.5 V dc to +7.0 V dc
DC voltage applied to outputs in high Z state	-0.5 V dc to +7.0 V dc
DC input voltage	-3.0 V dc to +7.0 V dc
Maximum power dissipation (P_D) 3/	1.0 W
Lead temperature (soldering, 10 seconds)	+260°C
Thermal resistance, junction-to-case (θ_{JC}):	See MIL-STD-1835
Junction temperature (T_J)	+175°C
Storage temperature range	-65°C to +150°C
Temperature under bias	-55°C to +125°C
Output current into outputs (low)	-16 mA

1/ Generic numbers are listed on the Standardized Military Drawing Source Approval Bulletin at the end of this document and will also be listed in MIL-BUL-103.
2/ Stresses above the absolute maximum rating may cause permanent damage to the device. Extended operation at the maximum levels may degrade performance and affect reliability.
3/ Must withstand the added P_D due to short circuit test; e.g., I_{OS}.

1.4 Recommended operating conditions.

Supply voltage (V_{CC})	+4.5 V dc to +5.5 V dc
Ground voltage (GND)	0 V dc
Input high voltage (V_{IH})	2.0 V dc minimum
Input low voltage (V_{IL})	0.8 V dc maximum
Case operating temperature range (T_C)	-55°C to +125°C

2. APPLICABLE DOCUMENTS

2.1 Government specification, standards, and bulletin. Unless otherwise specified, the following specification, standards, and bulletin 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.

STANDARDS

MILITARY

MIL-STD-480 - Configuration Control-Engineering Changes, Deviations and Waivers.
MIL-STD-883 - Test Methods and Procedures for Microelectronics.
MIL-STD-1835 - Microcircuit Case Outlines.

BULLETIN

MILITARY

MIL-BUL-103 - List of Standardized Military Drawings (SMDs).

(Copies of the specification, standards, and bulletin 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 Case outline(s). The case outline(s) shall be in accordance with 1.2.2 herein.

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

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

3.2.3.1 Unprogrammed devices. The truth table for unprogrammed devices for contracts involving no altered item drawing shall be as specified on figure 2. When required in groups A, B, C, or D (see 4.3), the devices shall be programmed by the manufacturer prior to test. A minimum of 50 percent of the total number of cells shall be programmed or at least 25 percent of the total number of cells to any altered item drawing.

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions $-55°C \le T_C \le +125°C$ $4.5\ V \le V_{CC} \le 5.5\ V$ unless otherwise specified	Group A subgroups	Device types	Limits		Unit
					Min	Max	
Output high voltage	V_{OH}	V_{CC} = 4.5 V, I_{OH} = -2.0 mA, V_{IN} = V_{IH}, V_{IL}	1, 2, 3	All	2.4		V
Output low voltage	V_{OL}	V_{CC} = 4.5 V, I_{OL} = 8.0 mA, V_{IN} = V_{IH}, V_{IL}	1, 2, 3	All		0.5	V
Input high voltage 1/	V_{IH}		1, 2, 3	All	2.0		V
Input low voltage 1/	V_{IL}		1, 2, 3	All		0.8	V
Input leakage current	I_{IX}	V_{IN} = 5.5 V to GND	1, 2, 3	All	-10	10	µA
Output leakage current	I_{OZ}	V_{CC} = 5.5 V, V_{OUT} = 5.5 V and GND	1, 2, 3	All	-40	40	µA
Output short circuit current 2/ 3/	I_{OS}	V_{CC} = 5.5 V, V_{OUT} = 0.5 V	1, 2, 3	All	-30	-90	mA
Standby power supply current	I_{CC1}	V_{CC} = 5.5 V, I_{OUT} = 0 mA, V_{IN} = GND	1, 2, 3	All		80	mA
Power supply current at frequency 3/	I_{CC2}	V_{CC} = 5.5 V, I_{OUT} = 0 mA, V_{IN} = 0 to 3 V, f = f_{MAX}	1, 2, 3	All		85	mA
Input capacitance 3/	C_{IN}	V_{CC} = 5.0 V, T_A = +25°C, f = 1 MHz (see 4.3.1c)	4	All		10	pF
Output capacitance 3/	C_{OUT}		4	All		10	pF
Functional tests		See 4.3.1d	7, 8A, 8B	All	L	H	V
Input or feedback to nonregistered output 4/	t_{PD}		9, 10, 11	01		35	ns
				02		25	
				03		20	
Input to output enable 5/	t_{EA}		9, 10, 11	01		35	ns
				02		30	
				03		20	

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55°C \le T_C \le +125°C$, $4.5\ V \le V_{CC} \le 5.5\ V$ unless otherwise specified	Group A subgroups	Device types	Limits Min	Limits Max	Unit
Input to output disable 3/ 5/	t_{ER}		9, 10, 11	01		35	ns
				02		30	
				03		20	
$\overline{OE}$ to output enable 5/	t_{PZX}		9, 10, 11	01		25	ns
				02		20	
				03		15	
$\overline{OE}$ to output disable 3/ 5/	t_{PXZ}		9, 10, 11	01		25	ns
				02		20	
				03		15	
Clock to output 4/	t_{CO}		9, 10, 11	01		35	ns
				02		25	
				03		20	
Input or feedback setup time 4/	t_{SU}		9, 10, 11	01	20		ns
				02	15		
				03	10		
Hold time 4/	t_H		9, 10, 11	01,02	5		ns
				03	3		
Clock period ($t_{SU} + t_{CO}$) 4/	t_P		9, 10, 11	01	55		ns
				02	40		
				03	30		
Clock width high 4/	t_{WH}		9, 10, 11	01	25		ns
				02	18		
				03	12		
Clock width low 4/	t_{WL}		9, 10, 11	01	25		ns
				02	18		
				03	12		

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55°C \le T_C \le +125°C$ $4.5\ V \le V_{CC} \le 5.5\ V$ unless otherwise specified	Group A subgroups	Device types	Limits Min	Limits Max	Unit
Maximum frequency $(1/(t_p))$ 3/ 4/	f_{MAX}		9, 10, 11	01	18.1		MHz
				02	25.0		
				03	33.3		
Input to asynchronous set of registered output 4/	t_S		9, 10, 11	01		40	ns
				02		25	
				03		20	
Input to asynchronous reset of registered output 4/	t_R		9, 10, 11	01		40	ns
				02		25	
				03		20	
Asynchronous set/reset recovery time 4/	t_{AR}		9, 10, 11	01	20		ns
				02	15		
				03	12		
Preload pulse width 4/	t_{WP}		9, 10, 11	All	15		ns
Preload setup time 3/ 4/	t_{SUP}		9, 10, 11	All	15		ns
Preload hold time 3/ 4/	t_{HP}		9, 10, 11	All	15		ns

1/ These are absolute values with respect to device ground and all overshoots due to system or tester noise are included.
2/ For test purposes, not more than one output at a time should be shorted. Short circuit test duration should not exceed 1 second. $V_{OUT} = 0.5\ V$ has been chosen to avoid test problems caused by tester ground degradation.
3/ Tested initially and after any design or process changes that affect that parameter, and therefore shall be guaranteed to the limits specified in table I.
4/ AC tests are performed with input rise and fall times of 5 ns or less, timing reference levels of 1.5 V, input pulse levels of 0 to 3.0 V, and the output load on figure 3, circuit A. See figure 4 for waveforms.
5/ Measured using the test load on figure 3, circuit B. See figure 4 for waveforms.

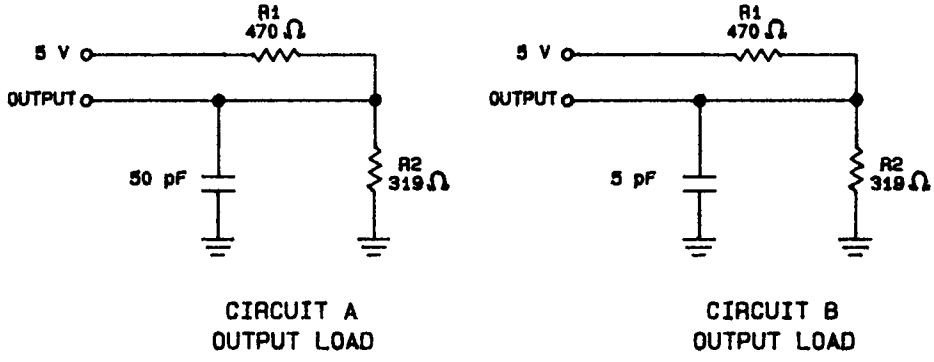
Device types	01 through 03		
Case outlines	K, L	3	X
Terminal number	Terminal symbol		
1	$\overline{PL}$	$\overline{PL}$	$\overline{PL}$
2	I_0	I_0	I_0
3	I_1	I_1	I_1
4	I_2	NC	I_2
5	I_3	I_2	NC
6	I_4	I_3	I_3
7	I_5	I_4	I_4
8	I_6	I_5	NC
9	I_7	I_6	I_5
10	I_8	I_7	I_6
11	I_9	NC	NC
12	GND	I_8	I_7
13	$\overline{OE}$	I_9	I_8
14	I/O_9	GND	I_9
15	I/O_8	$\overline{OE}$	GND
16	I/O_7	I/O_9	$\overline{OE}$
17	I/O_6	I/O_8	I/O_9
18	I/O_5	NC	I/O_8
19	I/O_4	I/O_7	NC
20	I/O_3	I/O_6	I/O_7
21	I/O_2	I/O_5	I/O_6
22	I/O_1	I/O_4	I/O_5
23	I/O_0	I/O_3	I/O_4
24	V_{CC}	I/O_2	I/O_3
25	---	NC	I/O_2
26	---	I/O_1	I/O_1
27	---	I/O_0	I/O_0
28	---	V_{CC}	V_{CC}

FIGURE 1. Terminal connections.

Truth table			
Input pins			Output pins
$\overline{OE}$	$\overline{PL}$	I	O
X	X	X	Z

NOTES:
1. Z = High impedance
2. X = Don't care

FIGURE 2. Truth table (unprogrammed).



*Including scope and jig (minimum values)

AC test conditions

Input pulse levels	GND to 3.0 V
Input rise and fall times	≤ 5 ns
Input timing reference levels	1.5 V
Output reference levels	1.5 V

Input pulses

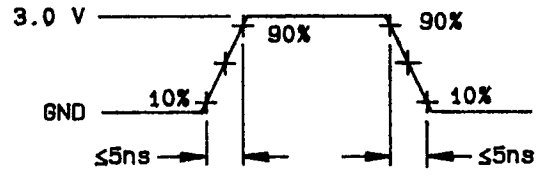


FIGURE 3. Output load circuits and test conditions.

Output control switching waveform

PARAMETER	V_X	OUTPUT WAVEFORM - MEASUREMENT LEVEL
$t_{PXZ(-)}$ $t_{ER(-)}$	1.5 V	0.5 V, V_{OH}, V_X
$t_{PXZ(+)}$ $t_{ER(+)}$	2.6 V	0.5 V, V_{OL}, V_X
$t_{PZX(+)}$ $t_{EA(+)}$	2.02 V	0.5 V, V_X, V_{OH}
$t_{PZX(-)}$ $t_{EA(-)}$	2.02 V	0.5 V, V_X, V_{OL}

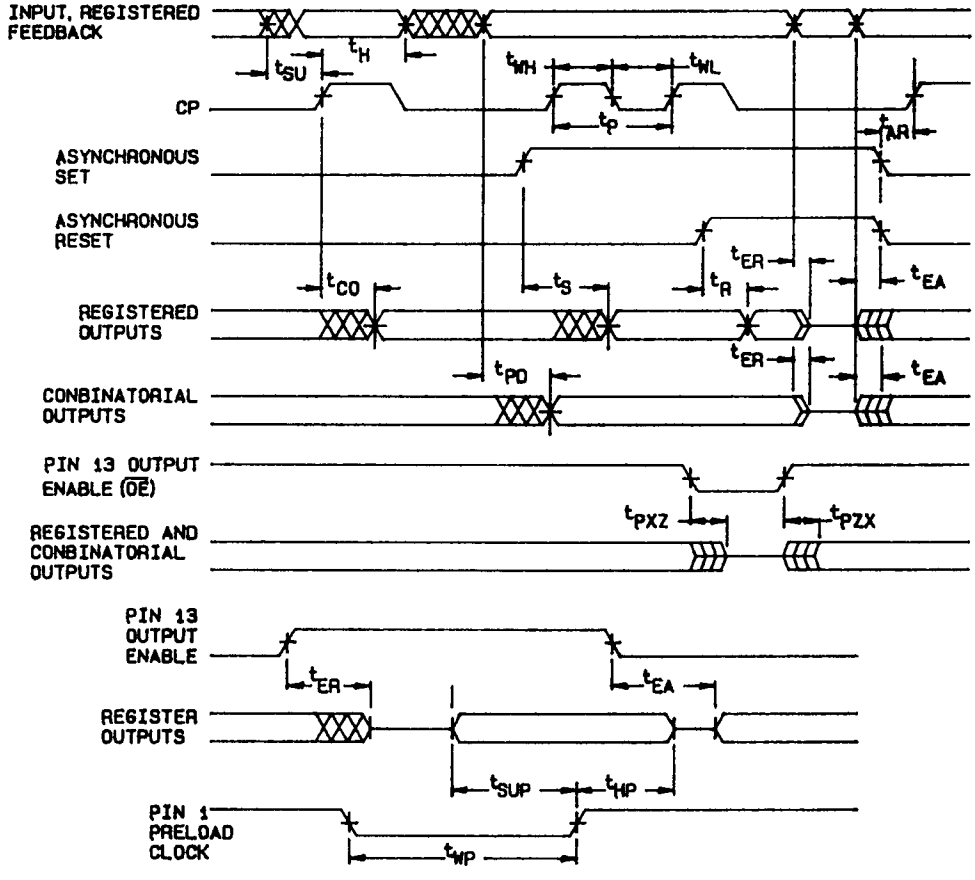


FIGURE 4. Switching waveforms.

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3.2.3.2 Programmed devices. The truth table for programmed devices shall be as specified by an attached altered item drawing.

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

3.4 Electrical test requirements. The electrical test requirements shall be the subgroups specified in table II. The electrical tests for each subgroup are defined in table I.

3.5 Marking. Marking shall be in accordance with MIL-STD-883 (see 3.1 herein). The part shall be marked with the PIN listed in 1.2 herein. In addition, the manufacturer's PIN may also be marked as listed in MIL-BUL-103 (see 6.6 herein).

3.6 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 MIL-BUL-103 (see 6.6 herein). The certificate of compliance submitted to DESC-ECS prior to listing as an approved source of supply shall affirm that the manufacturer's product meets the requirements of MIL-STD-883 (see 3.1 herein) and the requirements herein.

3.7 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.

3.8 Notification of change. Notification of change to DESC-ECS shall be required in accordance with MIL-STD-480 (see 2.1 herein).

3.9 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.

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

3.10.1 Unprogrammed device delivered to the user. All testing shall be verified through group A testing as defined in 3.2.3.1 and table II. It is recommended that users perform subgroups 7 and 9 after programming to verify the specific program configuration.

3.10.2 Manufacturer-programmed device 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.

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 C or D using the circuit submitted with the certificate of compliance (see 3.6 herein).

(2) T_A = +125°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 5 and 6 in table I, method 5005 of MIL-STD-883 shall be omitted.

c. Subgroup 4 (C_{IN} and C_{OUT} measurements) shall be measured only for the initial characterization and after any process or design changes which may affect input or output capacitance. Sample size is 15 devices with no failures, and all input and output terminals tested.

d. Subgroup 7 and 8 tests shall be sufficient to verify the truth table.

e. Unprogrammed devices shall be tested for programmability and ac performance compliance to the requirements of group A, subgroups 9, 10, and 11.

(1) A sample shall be selected to satisfy programmability requirements prior to performing subgroups 9, 10, and 11. Twelve devices shall be submitted to programming (see 3.2.3.1). If more than two devices fail to program, the lot shall be rejected. At the manufacturer's option, the sample may be increased to 24 total devices with no more than 4 total device failures allowable.

(2) Ten devices from the programmability sample shall be submitted to the requirements of group A, subgroups 9, 10, and 11. If more than two devices fail, the lot shall be rejected. At the manufacturer's option, the sample may be increased to 20 total devices with no more than 4 total device failures allowable.

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 C or D using the circuit submitted with the certificate of compliance (see 3.6 herein).

(2) T_A = +125°C, minimum.

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

c. For quality conformance inspection, the programmability sample (see 4.3.1e) shall be included in subgroup 1 test.

4.4 Programming procedures. The programming procedures shall be as specified by the device manufacturer and shall be made available upon request.

4.5 Electrostatic discharge sensitivity (ESDS) inspection. ESDS testing shall be performed in accordance with MIL-STD-883, method 3015. ESDS testing shall be measured only for initial qualification and after process or design changes which may affect ESDS classification.

TABLE II. Electrical test requirements. 1/ 2/ 3/ 4/

MIL-STD-883 test requirements	Subgroups (per method 5005, table I)
Interim electrical parameters (pre burn-in) (method 5004)	1
Final electrical test parameters (method 5004) for unprogrammed devices	1*,2,3,7*,8A, 8B
Final electrical test parameters (method 5004) for programmed devices	1*,2,3,7*,8A, 8B,9
Group A test requirements (method 5005)	1,2,3,4**,7, 8A,8B,9,10,11
Groups C and D end-point electrical parameters (method 5005)	2,3,7,8A,8B

1/ * indicates PDA applies to subgroups 1 and 7.
2/ Any or all subgroups may be combined when using high-speed testers.
3/ ** see 4.3.1c.
4/ Subgroups 7 and 8 functional tests shall also verify that no cells are programmed for unprogrammed devices or that the altered item drawing pattern exists for programmed devices.

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 Configuration control of SMDs. All proposed changes to existing SMDs will be coordinated with the users of record for the individual documents. This coordination will be accomplished in accordance with MIL-STD-481 using DD Form 1693, Engineering Change Proposal (Short Form).

6.4 Record of users. Military and industrial users shall inform Defense Electronics Supply Center when a system application requires configuration control and the applicable SMD. DESC will maintain a record of users and this list will be used for coordination and distribution of changes to the drawings. Users of drawings covering microelectronics devices (FSC 5962) should contact DESC-ECS, telephone (513) 296-6047.

6.5 Comments. Comments on this drawing should be directed to DESC-ECS, Dayton, Ohio 45444, or telephone (513) 296-5377.

6.6 Approved sources of supply. Approved sources of supply are listed in MIL-BUL-103. The vendors listed in MIL-BUL-103 have agreed to this drawing and a certificate of compliance (see 3.6 herein) has been submitted to and accepted by DESC-ECS.