

MILITARY SPECIFICATION
MICROCIRCUITS, LINEAR, 8 BIT, DIGITAL-TO-ANALOG
CONVERTERS, MONOLITHIC SILICON

This amendment forms a part of Military Specification MIL-M-38510/113, dated 25 April 1979, and is approved for use by all Departments and Agencies of the Department of Defense.

PAGE 1

- 1.1, line 2: Delete "Three" and substitute "Two".
- 1.4, Supply voltage range, delete and substitute as follows: "Supply voltage range 2".
- 1.4, last line: Delete "Case" as substituted in amendment 4 and reinstate "Ambient".

Add the following footnote before beneficial comments:

"2/ Sequence of power supply turn-on must be $-V_{CC}$ prior to $+V_{CC}$ unless the positive supply has current limiting resistance of 100 ohms $\pm 10\%$. If a current limiting resistance is used, a slight degradation in linearity will occur."

PAGE 2

- 1.5, under maximum allowable power dissipation: Delete " T_C " as substituted in amendment 4 and reinstate " T_A ".
- 3.1, line 2: Delete "specified herein" and substitute "specified in 1.2.3".

PAGE 3

- * TABLE I, Full scale current, conditions column: Delete " $T_A = 25^\circ C$ " (2 places).
- TABLE I, Symbol $P_{SSIFS-2}$, conditions column: Following " $-V_{CC} = -4.5 V$ to $= -5.5 V$ " add " $I_{REF} = 1 mA$ ".

PAGE 4

- TABLE I, Symbol I_{IH} , minimum limits column (2 places): Delete " -0.01 " and substitute " -0.05 ".
- TABLE I, Symbols, I_{FS}^+ , $\overline{I_{FS}^+}$, I_{FS}^- , $\overline{I_{FS}^-}$, Device 02 limits column: Delete " 1.90 " Min and " 2.08 " Max (4 places) and substitute " 1.94 " Min and " 2.04 " Max (4 places).
- TABLE I, Symbols ΔI_{FSC} and $\overline{\Delta I_{FSC}}$, conditions column: Delete " T_C " (4 places) as substituted in amendment 4 and reinstate " T_A " (4 places).

PAGE 5

- TABLE I, Symbols dI_0/dt , t_{SHL} , and t_{SLH} , conditions column: Add " $T_A = 25^\circ C$ ".

PAGE 6

- * 3.6, delete and substitute the following:
- "3.6 Electrical test requirements. Electrical test requirements for each device class shall be the subgroups specified in table II. The electrical tests for each subgroup are described in table III."

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TABLE II, group A test requirements, class S devices: Add "12".

TABLE II: Delete class C devices column in its entirety, and all other references to class C throughout the specification.

* 3.7, delete as substituted in amendment 2 and substitute the following:

"3.7 Marking. Marking shall be as specified in MIL-M-38510."

4.2.1, add the following new paragraph:

"4.2.1 Qualification extension. For qualification inspection, if a manufacturer qualifies to device type 02 which is designed and manufactured identically (same die, same process, same screening) in all respects (except electrical testing) to device type 01, then qualification may be extended to device type 01 when authorized by the qualifying activity. Additionally, part I qualification may be extended to device type 01 only after acceptance by the qualifying activity of subgroup C1 testing performed on this device type and submission of data in accordance with appendix D of MIL-M-38510."

PAGE 7

4.3d, delete as substituted in amendment 2 and substitute the following:

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

4.4.1, add the following:

"c. Subgroup 12 shall be added to group A inspection as specified in table III herein. The LTPD for subgroup 12 shall be five for all classes."

4.4.3b, delete as substituted in amendment 2 and substitute the following:

"b. Life tests for class B (method 1005 of MIL-STD-883): Test condition D using the circuit shown on figure 3, test condition C using the circuit shown on figure 4, or test condition F using the circuit shown on figure 5 (see 4.3a.2, note)."

4.4.3, add the following new paragraph:

"c. Subgroup 12 shall be added to group C inspection as specified in table III herein. The LTPD for subgroup 12 shall be 10 for all classes."

* 4.5.2, delete title and substitute new title as follows:

"4.5.2 Burn-in and life test cooldown procedure."

4.6: Delete in its entirety.

PAGE 9

FIGURE 2, at top of page, below "Device types 01 and 02" add "Circuit A".

PAGE 10

FIGURE 2, at top of page, below "Device types 01 and 02" add "Circuit B".

PAGE 11

FIGURE 2, at top of page, below "Device types 01 and 02" add "Circuit C".

FIGURE 2, lower left corner: Delete node connection between emitter of Q64 and the 800 ohms resistor.

PAGE 12

FIGURE 2, at top of page, below "Device types 01 and 02" add "Circuit D".

FIGURE 2, add new Circuit E as printed on page 8 of this amendment.

FIGURE 2, add new Circuit F as printed on page 9 of this amendment.

PAGE 13

FIGURE 3, delete "+18 V" (2 places) and "-18 V" and substitute "+15 V" (2 places) and "-15 V" respectively.

PAGE 16

FIGURE 6: Delete and substitute new static test circuit as printed on page 10 of this amendment.

PAGE 18

FIGURE 7: Delete and substitute new test circuit as printed on page 11 of this amendment.

PAGE 21

TABLE III, Subgroup column: Delete "T_C" as substituted in amendment 4 and reinstate "T_A". Make the same change on pages 22 through 39.

TABLE III, tests 3 and 4, equation column; delete and substitute the following:

$$I_{FS} = 1.992 - 0.01E_1$$
$$\overline{I_{FS}} = 1.992 - 0.01E_2$$

TABLE III, Tests 17, 18, 19, and 20, adapter pin number 12: Add "-" preceding all four values.

TABLE III, tests 17, 18, 19, and 20, energized relays: Add "K5" to all tests.

TABLE III, tests 26, 27, 28, and 29, minimum limits columns for device types 01 and 02: Delete "-0.01" (8 places) and substitute "-0.05" (8 places). Make the same changes on page 22 (tests 30-33), page 27 (tests 129-136), and page 33 (tests 232-239).

PAGE 22

TABLE III, tests 34 through 41, adapter pin numbers, 1-8, logic state column: Delete "10000000, 01000000, 00100000, 00010000, 00001000, 00000100, 00000010, 00000001", respectively and substitute "01111111, 10111111, 11011111, 11101111, 11110111, 11111011, 11111101, 11111110", respectively.

TABLE III, test 42: adapter pin numbers 11, 12, 13, 14, and 15: Add "15, -15, 30, 0, and 18", respectively.

TABLE III, test 42, adapter pin numbers 16-23 logic state column: Add "00000000".

TABLE III, test 42, energized relays column: Add "K3".

TABLE III, tests 43 and 44, equation column, delete and substitute the following:

$$I_{FS}^+ = 1.992 - 0.01(E_{24} - E_{23})$$
$$\overline{I_{FS}^+} = 1.992 - 0.01(E_{25} - E_{23})$$

TABLE III, tests 43 and 44, limits column: Device 01, delete "1.94" min, "2.04" max and substitute "1.90" min, "2.08" max; device 02, delete "1.90" min, "2.08" max and substitute "1.94" min, "2.04" max.

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TABLE III, test 45, adapter pin numbers 16-23, logic state column, delete "11111111" and substitute "00000000". In logic state column 1-8, delete "11111111".

TABLE III, test 45, energized relays column: Add "K3".

TABLE III, tests 46 and 47, equation column, delete and substitute the following:

$$I_{FS-} = 1.992 - 0.01(E_{27} - E_{26})$$

$$\overline{I_{FS-}} = 1.992 - 0.01(E_{28} - E_{26})"$$

TABLE III, tests 46 and 47, limits column: Device 01, delete "1.94" min, "2.04" max and substitute "1.90" min, "2.08" max; device 02, delete "1.90" min, "2.08" max and substitute "1.94" min, "2.04" max.

TABLE III, tests 52 and 53, adapter pin numbers 1-8, logic state column: Delete "11111111" and "00000000" and substitute "00000000" and "11111111", respectively.

PAGE 26

TABLE III, test 101, equation column: Delete " $(I_{08})_b = I_{FS} \times \frac{1}{255} - 0.01(E_{63})$ " and substitute " $(I_{08})_b = -0.01(E_{63})$ ".

TABLE III, tests 106 and 107, equation column, delete and substitute the following:

$$I_{FS} = 1.992 - 0.01E_{64}$$

$$\overline{I_{FS}} = 1.992 - 0.01E_{65}"$$

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TABLE III, tests 120-123 inclusive, Adapter pin number 12 column, Add "-" preceding all four values.

TABLE III, tests 120-123 inclusive, energized relays column: Add "K5".

TABLE III, tests 137 through 141, adapter pin numbers 1-8, logic state column: Delete "10000000, 01000000, 00100000, 00010000, 00001000", respectively and substitute "01111111, 10111111, 11011111, 11101111, 11110111", respectively.

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TABLE III, tests 142 through 144, adapter pin numbers 1-8, logic state column: Delete "00000100, 00000010, 00000001", respectively and substitute "11111011, 11111101, 11111110", respectively.

TABLE III, test 145, adapter pin numbers 11, 12, 13, 14, and 15: Add "15,-15,30,0, and 18", respectively.

TABLE III, test 145, adapter pin numbers 16-23, logic state column: Add "00000000".

TABLE III, test 145, energized relays column: Add "K3".

TABLE III, tests 146 and 147, equation column, delete and substitute the following:

$$I_{FS+} = 1.992 - 0.01(E_{87} - E_{86})$$

$$\overline{I_{FS+}} = 1.992 - 0.01(E_{88} - E_{86})"$$

TABLE III, tests 146 and 147, limits column: Device 01, delete "1.94" min, "2.04" max and substitute "1.90" min, "2.08" max; device 02, delete "1.90" min, "2.08" max and substitute "1.94" min, "2.04" max.

TABLE III, test 148, adapter pin numbers 1-8, logic state column: Delete "11111111".

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TABLE III, test 148, adapter pin numbers 16-23, logic state column: Delete "11111111" and substitute "00000000".

TABLE III, test 148, energized relays column: Add "K3".

TABLE III, tests 149 and 150, equation column, delete and substitute the following:

$$I_{FS} = 1.992 - 0.01(E_{90} - E_{89})$$
$$\overline{I_{FS}} = 1.992 - 0.01(E_{91} - E_{89})"$$

TABLE III, tests 149 and 150, limits column: Device 01, delete "1.94" min, "2.04" max and substitute "1.90" min, "2.08" max; device 02, delete "1.90" min, "2.08" max" and substitute "1.94" min, "2.04" max".

TABLE III, test numbers 155 and 156, adapter pin numbers 1-8, logic state column: Delete "11111111" and "00000000" and substitute "00000000" and "11111111", respectively.

PAGE 32

TABLE III, tests 209 and 210, equation column, delete and substitute the following:

$$I_{FS} = 1.992 - 0.01E_{127}$$
$$\overline{I_{FS}} = 1.992 - 0.01E_{128}"$$

PAGE 33

TABLE III, tests 223-226 inclusive, adapter pin number 12 column: Add "-" preceding all four values.

TABLE III, tests 223-226 inclusive, energized relays column: Add "K5".

TABLE III, tests 240 through 243, adapter pin numbers 1-8, logic state column: Delete "10000000, 01000000, 00100000, 00010000", respectively and substitute "01111111, 10111111, 11011111, 11101111", respectively.

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TABLE III, tests 244 through 247, adapter pin numbers 1-8, logic state column: Delete "00001000, 00000100, 00000010, 00000001", respectively and substitute "11110111, 11111011, 11111101, 11111110", respectively.

TABLE III, tests 244 through 247, units column: Delete "A" and substitute " μ A".

TABLE III, test 248, adapter pin numbers 11, 12, 13, 14, and 15: Add "15,-15,30,0, 18", respectively.

TABLE III, test 248, adapter pin numbers 16-23, logic state column: Add "00000000".

TABLE III, test 248, energized relays column: Add "K3".

TABLE III, tests 249 and 250, equation column, delete and substitute the following:

$$I_{FS}^+ = 1.992 - 0.01(E_{150} - E_{149})$$
$$\overline{I_{FS}^+} = 1.992 - 0.01(E_{151} - E_{149})"$$

TABLE III, tests 249 and 250, limits column: Device 01, delete "1.94" min, "2.04" max and substitute "1.90" min, "2.08" max; device 02, delete "1.90" min, "2.08" max and substitute "1.94" min, "2.04" max.

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TABLE III, test 251, adapter pin numbers 1-8, logic state column: Delete "11111111".

TABLE III, test 251, adapter pin numbers 16-23, logic state column: Delete "11111111" and substitute "00000000".

TABLE III, test 251, energized relays column: Add "K3".

TABLE III, tests 252 and 253, equation column, delete and substitute the following:

$$I_{FS-} = 1.992 - 0.01(E_{153} - E_{152})$$
$$\overline{I_{FS-}} = 1.992 - 0.01(E_{154} - E_{152})"$$

TABLE III, test 252 and 253, limits column: Device 01, delete "1.94" min, "2.04" max and substitute "1.90" min, "2.08" max; device 02, delete "1.90" min, "2.08" max and substitute "1.94" min, "2.04" max.

TABLE III, test 254 and 255, limits column: Device 01, delete "-4.0" min, "4.0" max and substitute "-8.0" min, "8.0" max; device 02, delete "-4.0" min, "4.0" max and substitute "-8.0" min, "8.0" max.

TABLE III, tests 254 and 255, units column: Delete "A" and substitute "μA".

TABLE III, tests 258 and 259, adapter pin numbers 1-8 logic state column: Delete 11111111 and 00000000 and substitute 00000000 and 11111111, respectively.

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TABLE III, test 311, equation column: Delete equation and substitute:

$$T_C(I_{FS}) = \frac{(E_1 - E_{127})}{0.8E_1} \times 10^4"$$

TABLE III, test 313, equation column: Delete equation and substitute:

$$T_C(I_{FS}) = \frac{(E_2 - E_{128})}{0.8E_2} \times 10^4"$$

PAGE 39

TABLE III, tests 320, 321 and 322, subgroup column: Delete "12 T_C = 25°C" as substituted in amendment 4 and substitute "12 T_A = 25°C".

PAGE 40

TABLE IV, Heading, note: Delete "T_C" as substituted in amendment 4 and reinstate "T_A".

6.3, line 1; delete and substitute the following:

"6.3 Ordering data. The contract or purchase order should specify the following:"

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The margins of this amendment are marked with an asterisks to indicate where changes from previous amendment were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous amendment.

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

Preparing activity:
Air Force - 17

(Project 5962-0681)

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

User activities:
Army - SM
Navy - CG, MC, AS
Air Force - 19

Agent:
DLA - ES

Device types 01 and 02

Circuit F

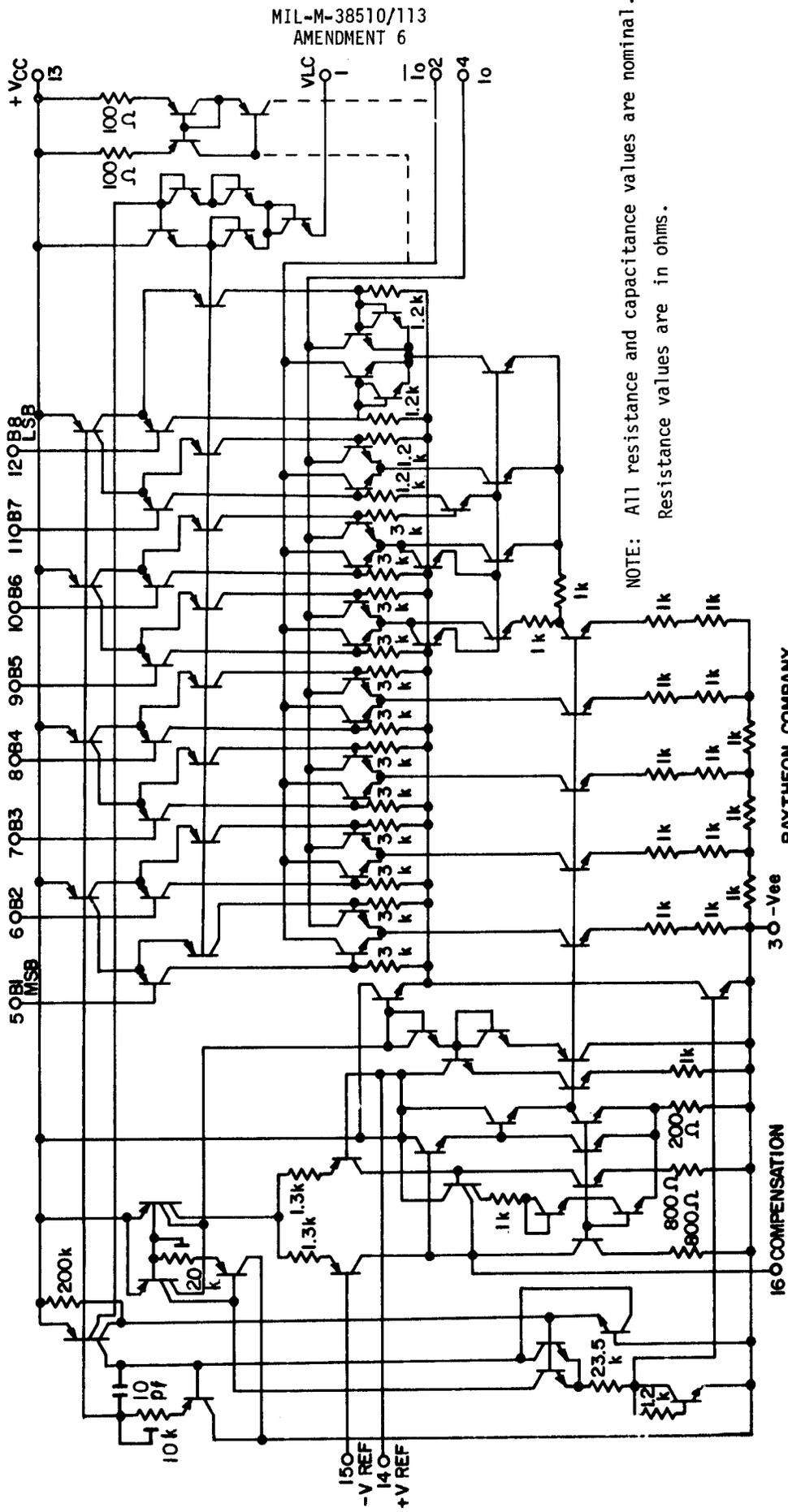


FIGURE 2. Schematic circuits - Continued.

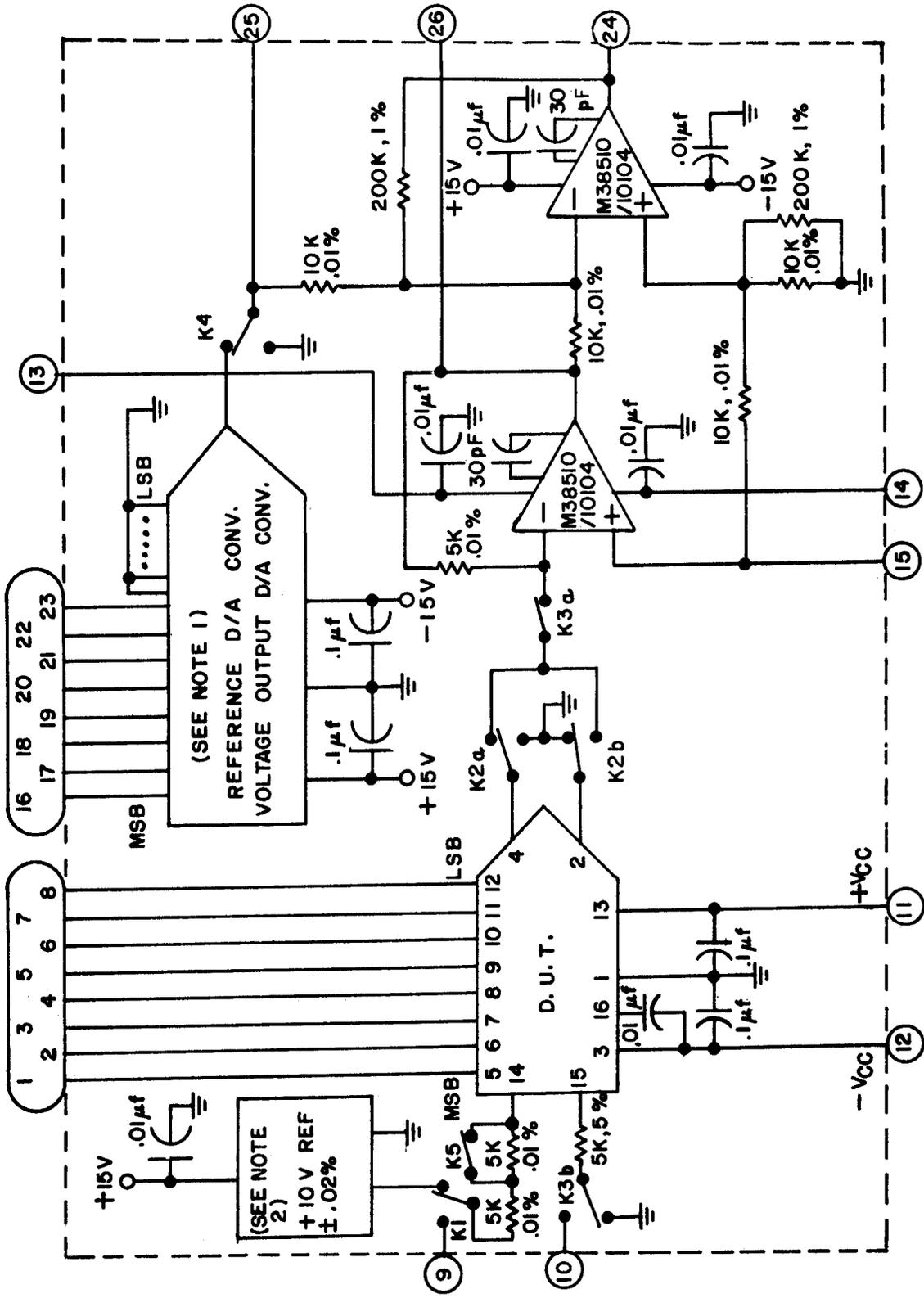
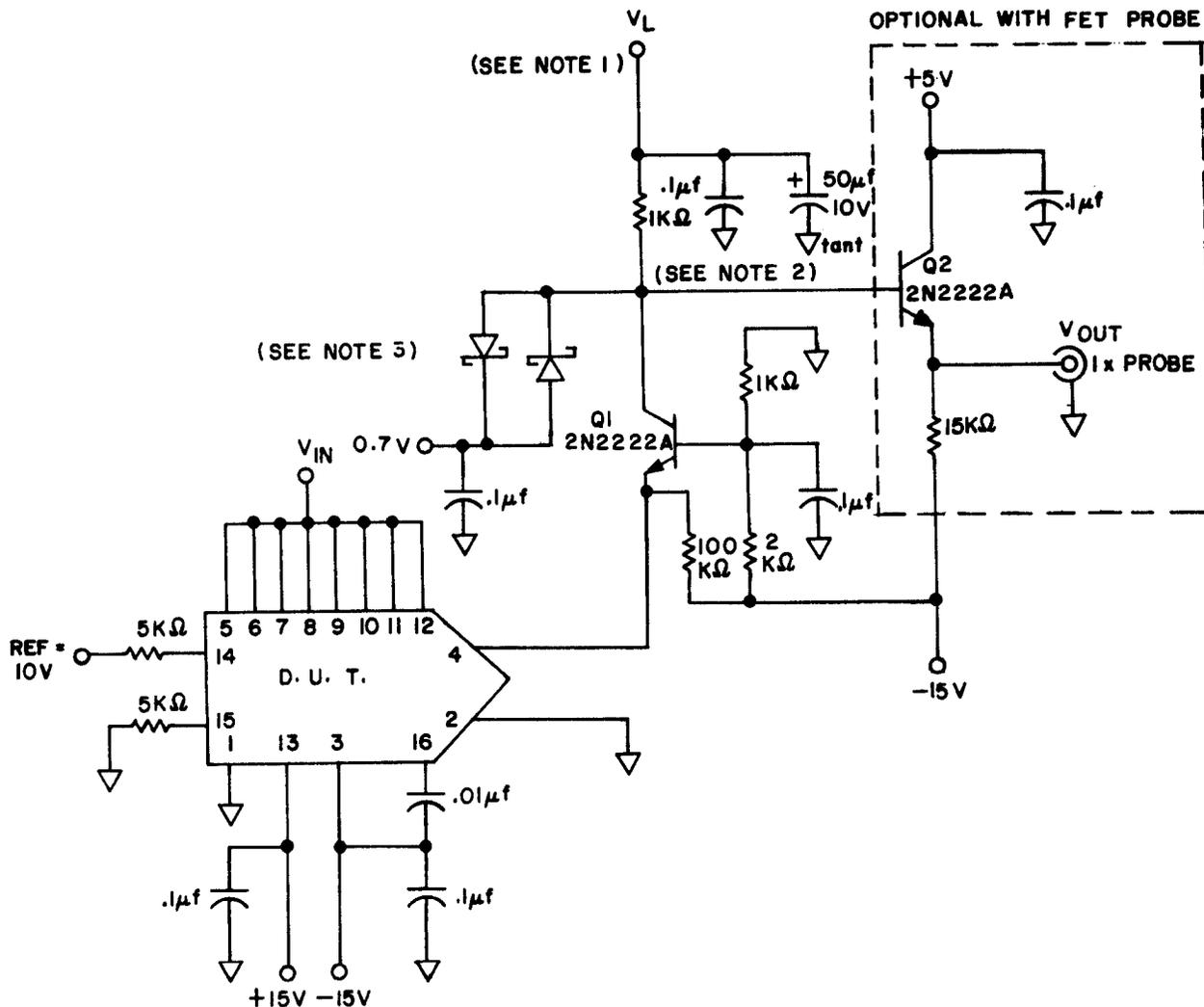


FIGURE 6. Test circuit for static tests.



NOTES:

1. For turn-ON, $V_L = 2.7$ V; for turn-OFF, $V_L = 0.7$ V.
2. Minimize capacitance at this node, by using short runs and adequate spacing between runs.
3. Diodes must be Schottky type (MBD 501 or equivalent).
4. Bandwidth of oscilloscope used for waveform measurement should be 50 MHz minimum; saturation of preamp must be avoided.

FIGURE 7. Test circuit for propagation delay and settling time, device types 01 and 02.