FINAL ENGINEERING REPORT

FOR

MRIR-PCM TELEMETRY UNIT

CONTRACT NO. NAS5-10215

Prepared for

Systems Engineering Branch, Code 731
National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

5 April 1967

Prepared by

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SECTION 1

INTRODUCTION

1.1 GENERAL

Fabrication of three Medium Resolution Infrared Radiometer Telemetry Electronics (MRIR-T/ME) units for the NIMBUS B MRIR experiment has been completed, functionally tested, and delivered. The three units consisted of one Prototype and two Flight qualified subassemblies. A final engineering report documenting the history, fabrication, and testing program of these completed subsystems is presented herein. Figure 1-1 indicates the configuration of a MRIR-T/ME unit with the top cover removed.

1.2 SCOPE

This final engineering report contains information applicable to the Prototype and Flight Model MRIR-T/ME subassemblies. Included within this report are electrical, mechanical, and functional testing aspects of these subassemblies as well as sufficient data for operation and maintenance purposes.

1.3 CONTRACT HISTORY

A firm fixed-price contract was awarded to California Computer Products, Inc. by the NASA Goddard Space Flight Center, Greenbelt, Maryland on 16 June 1966 bearing contract number NAS5-10215.

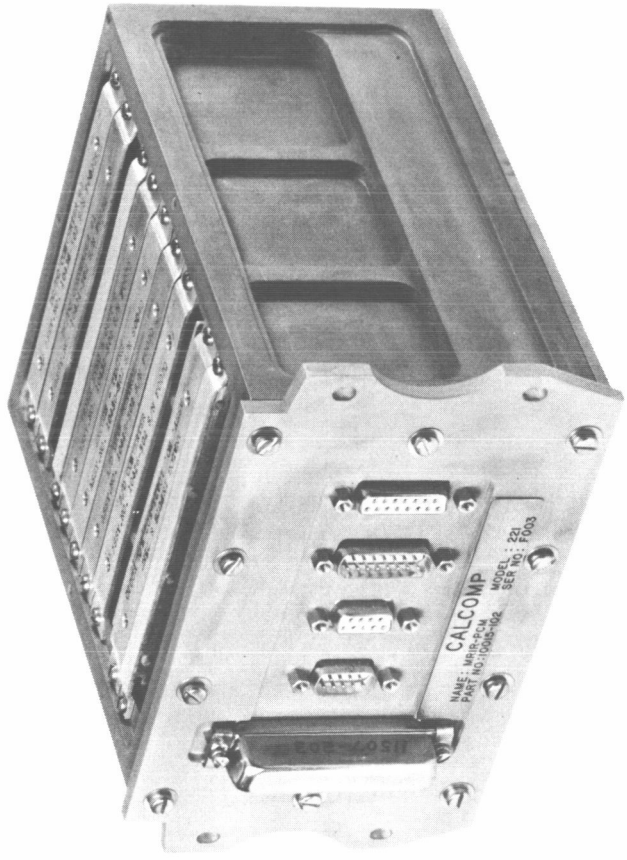


FIGURE 1-1

MRIR Subsystem (Cover Removed)

The purpose of this contract is to fabricate, test and deliver for the NIMBUS B Medium Resolution I. R. experiment one Prototype and two Flight Model MRIR-T/ME units in accordance with NASA/GSFC Specification S-731-P-18A dated 3 May 1966. Three man months of integration support is also included as part of the contractural requirements commencing with delivery of the prototype subassembly.

Delivery of the Prototype Model MRIR-T/ME unit was made with a final functional test sell-off demonstration to the NASA Technical Officer on 17 December 1966, amounting to a 2-day slip in the scheduled delivery. The two Flight models were delivered simultaneously on 26 January 1967 after successfully completing a final functional test demonstration monitored by a duly appointed Government representative. Completion of these two units accelerated the scheduled delivery by approximately 30 days.

Fabrication of the deliverable units adhered to the results and recommendations of the development effort for the Engineering Model MRIR-T/ME unit. Design changes were minimal, involving principally wire harness modifications as a result of minor changes in pin assignments on some printed circuit boards.

1.4 REPORT ORGANIZATION

This report specifically pertains to the documentation of data pertinent to the Prototype and Flight model MRIR-T/ME subsystems.

Section 2 discusses the basic operation of the Telemetry Electronics accompanied by appropriate timing diagrams and schematics where applicable.

Calibration data for the analog inputs and telemetry data outputs are included in Section 3 as a result of System and Operational Tests.

The remainder of the report will contain a bibliography of documents and test specifications applicable to this contract. Also included are schematics, layouts and mechanical drawings to aid in any maintenance required on these units.

1.5 REFERENCES

References directly applicable to the fabrication and testing of the Prototype and Flight Model MRIR-T/ME units are listed as follows:

- NASA/GSFC Specification S-731-P-18A, "Medium Resolution IR (MRIR) Experiment Prototype and Flight Model Digital Electronics Telemetry Units for NIMBUS B," 3 May 1966.
- NASA/GSFC Specification S-653-P-14, "An Environmental Specification for the NIMBUS B Subsystems," 29 June 1965.
- CalComp Test Specification A0401-005, "Environmental Test Specification for NIMBUS B MRIR-T/ME Units."
- CalComp Operator's Manual D0106-003, "MRIR Digital Subsystem Bench Test Equipment for NIMBUS B."
- CalComp Maintenance Manual D0106-004, "MRIR Digital Subsystem Bench Test Equipment for NIMBUS B."

SECTION 2

ELECTRONIC DESIGN

2.1 GENERAL DESCRIPTION MRIR-T/ME SUBSYSTEM

The purpose of the MRIR Telemetry Electronics Subsystem as used in the NIMBUS B spacecraft is to convert analog data received from the Radiometer Electronics to a serialized digital format. Five channels of analog data are available from the Radiometer unit for sequential conversion to the corresponding digital equivalent. The analog signals are gated to an Analog-to-Digital (A/D) converter where 34.7 conversions per second are performed on each input channel including the injection of a synchronizing word or frame at the completion of every fifth sample. Conversion accuracy of the A/D converter is maintained at one part in 256 (8 bits) within a temperature range of $-5^{\circ}C$ to $+55^{\circ}C$.

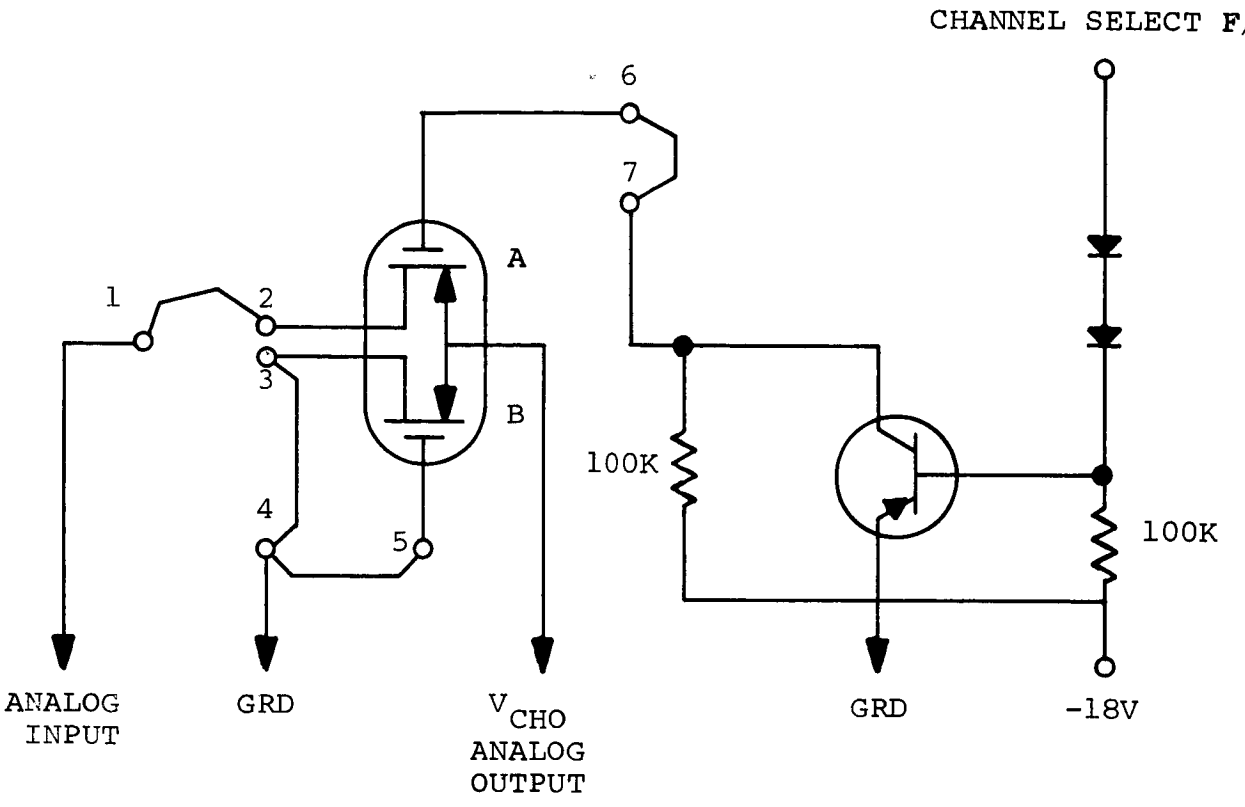
2.1.1 CIRCUIT DESIGN MODIFICATIONS

The circuit configuration employed in the flight and prototype MRIR units are basically identical to that of the engineering model. As a result of fabricating the engineering model, certain problem areas were found principally related to printed circuit board layouts. These problems were corrected for the most part in the engineering model but some recommendations remained to be incorporated into the prototype and flight model hardware.

Before commencing fabrication of the deliverable hardware, the recommendations of the engineering model were incorporated. Each printed circuit board was carefully scrutinized and modified as necessary. The area of paramount concern was to increase the solder pad area where each integrated circuit lead attaches. It was found that the original pad area was too small in relation to the IC lead, thus affording inadequate solder flow.

A second area of concern was the MOS-FET devices used as the analog input switches. Since these devices are easily damaged in the course of handling, due to static electric charges, it was recommended that one FET package containing dual MOS-FET elements be used for each input channel. This recommendation came about after attempting to replace one of these multilead devices that failed on the engineering model. In order to incorporate this redundancy on the Prototype and Flight models, it was necessary to design the circuit board layout to enable the spare half to be easily wired into the circuit. This was accomplished as shown in a typical configuration of Figure 2-1.

The output of the A/D converter is formatted with a frame synchronizing word producing a word length of 28.8 milliseconds. The converted analog signals form a serial bit-stream consisting of one 8-bit frame synchronizing word (10111000) and five 8-bit digitized conversions of the radiometer data, each word corresponding to one input channel. The formatted data from the telemetry electronics unit is routed in split-phase form, least significant bit first, at 1.66-kHz data bit-rate (208-Hz data word rate) to the satellite digital tape storage unit.



A - MOS-FET SHOWN IN OPERATING MODE

B - MOS-FET SHOWN IN SPARE CONDITION (GATE/DRAIN GROUNDED)

FIGURE 2-1

Dual MOS-FET Unit for Typical Analog Input Switch

2.2 ELECTRONIC CIRCUIT OPERATION

The MRIR-T/ME unit contains seven printed circuit boards which plug into connectors to form an integral unit for processing and converting analog signals into an equivalent digital format. Two of the circuit boards function together to provide the required secondary power levels which are generated from the negative 24.5-volt primary satellite power source. The remaining five boards contain all the electronics required for the conversion and processing. A brief description of each circuit board is presented in the following sections. Schematic and assembly drawings for all circuit boards are contained in Appendix A.

2.2.1 ANALOG INPUT AND 25-KHZ CLOCK GENERATOR (Figure 2-2)

This circuit board serves a dual purpose within the subsystem. The analog input signals are gated to the converter by means of MOS-FET devices controlled by a commutating ring counter. Five dual MOS-FET's are employed, one for each channel. Only one-half of each dual element is used per channel while the remaining half is jumpered out of the circuit. The purpose of this is to provide a spare gate simply by changing selected jumper wires on the circuit board, thus eliminating undue handling of these MOS devices. The 25-kHz generator is transformer coupled to a 200-kHz input signal originating from the satellite clock subsystem within the spacecraft. The resulting 25-kHz clock is achieved by dividing the 200-kHz input by a 3-stage flip-flop network.

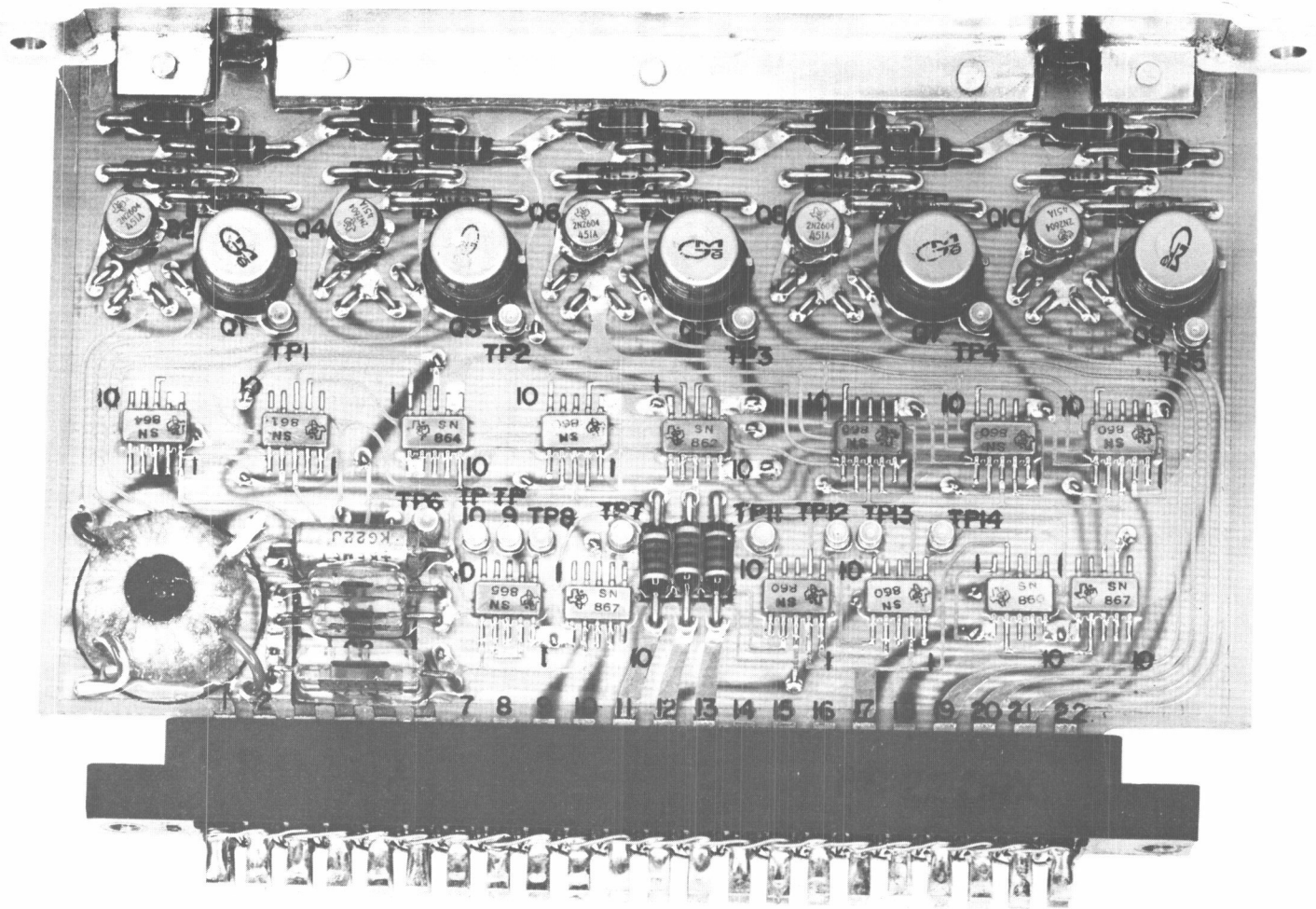


FIGURE 2-2

Analog Input and 25-kHz Generator

2.2.2 A/D CONVERTER (Figure 2-3)

The A/D converter circuit board contains the necessary elements for performing the analog-to-digital conversion. The primary elements are a precision resistor ladder network, a precision voltage reference supply and comparator amplifier. A set of constant current sources and transistor switches corresponding to the 8-bit digital word are also incorporated on this circuit board.

2.2.3 A/D DATA CONTROL (Figure 2-4)

This module contains the control logic required to switch the constant current source switches on the A/D converter circuit board. Two registers each containing eight flip-flops are included on this board. One register serves to produce the control signal to successively turn on each current source depending upon the analog input voltage as compared to the output ladder voltage. The second register serially stores the data representing each bit of the A/D conversion. Also incorporated on this A/D control circuit board is Frame Sync Inhibit logic. This logic forces the lease significant bit to a "one" if the analog data converted produced the same bit pattern as the Frame Sync word, thus prohibiting a false frame sync word to be formed.

2.2.4 ENCODE - TIMING GENERATOR (Figure 2-5)

This board contains nine flip-flops used to provide timing control signals. Six flip-flops are used to divide a 10-kHz input signal to 1.66 kHz (one output bit time) and 208 Hz (one word time). A transfer pulse is generated to gate the

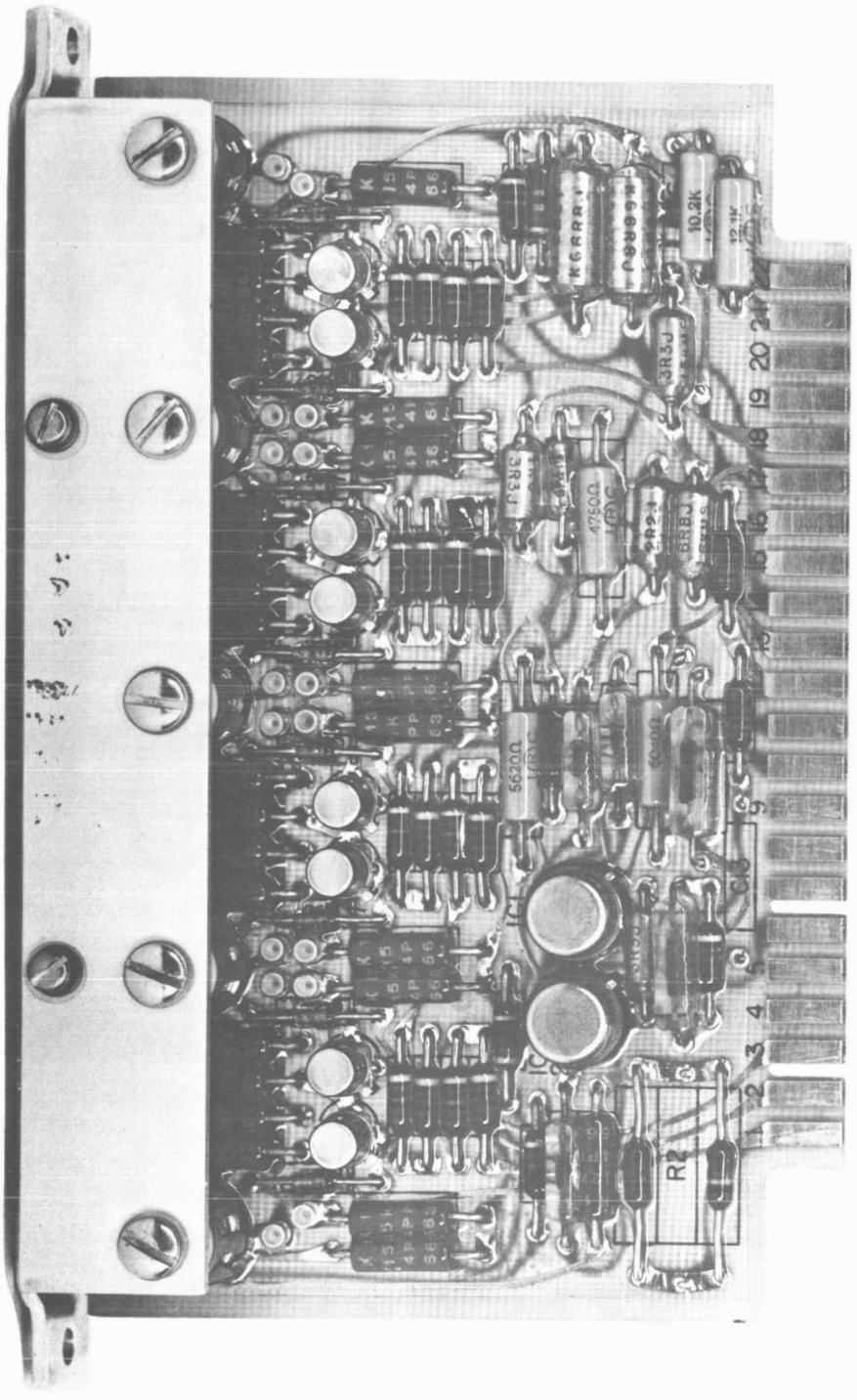


FIGURE 2-3

A/D Converter

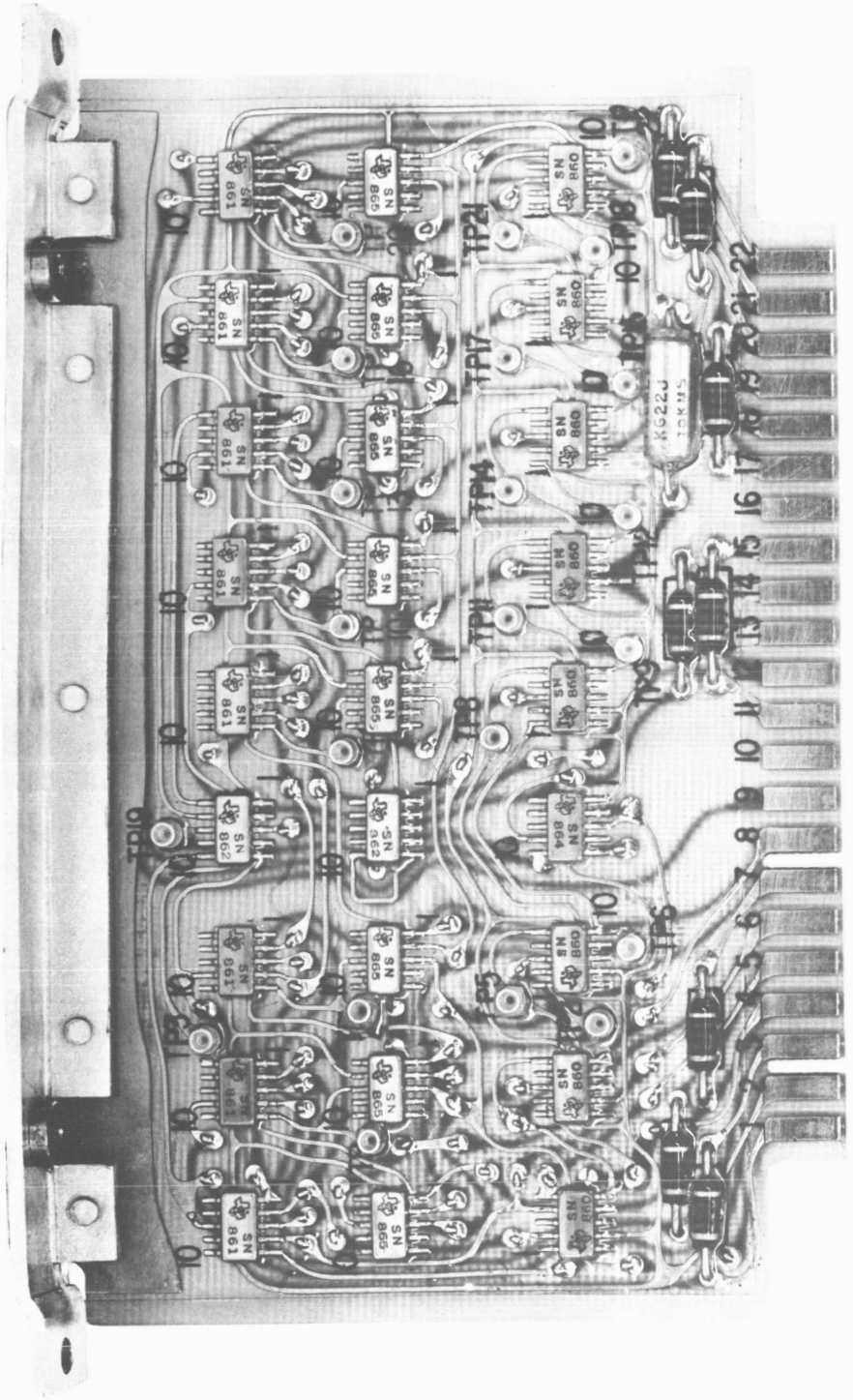


FIGURE 2-4

A/D Data Control

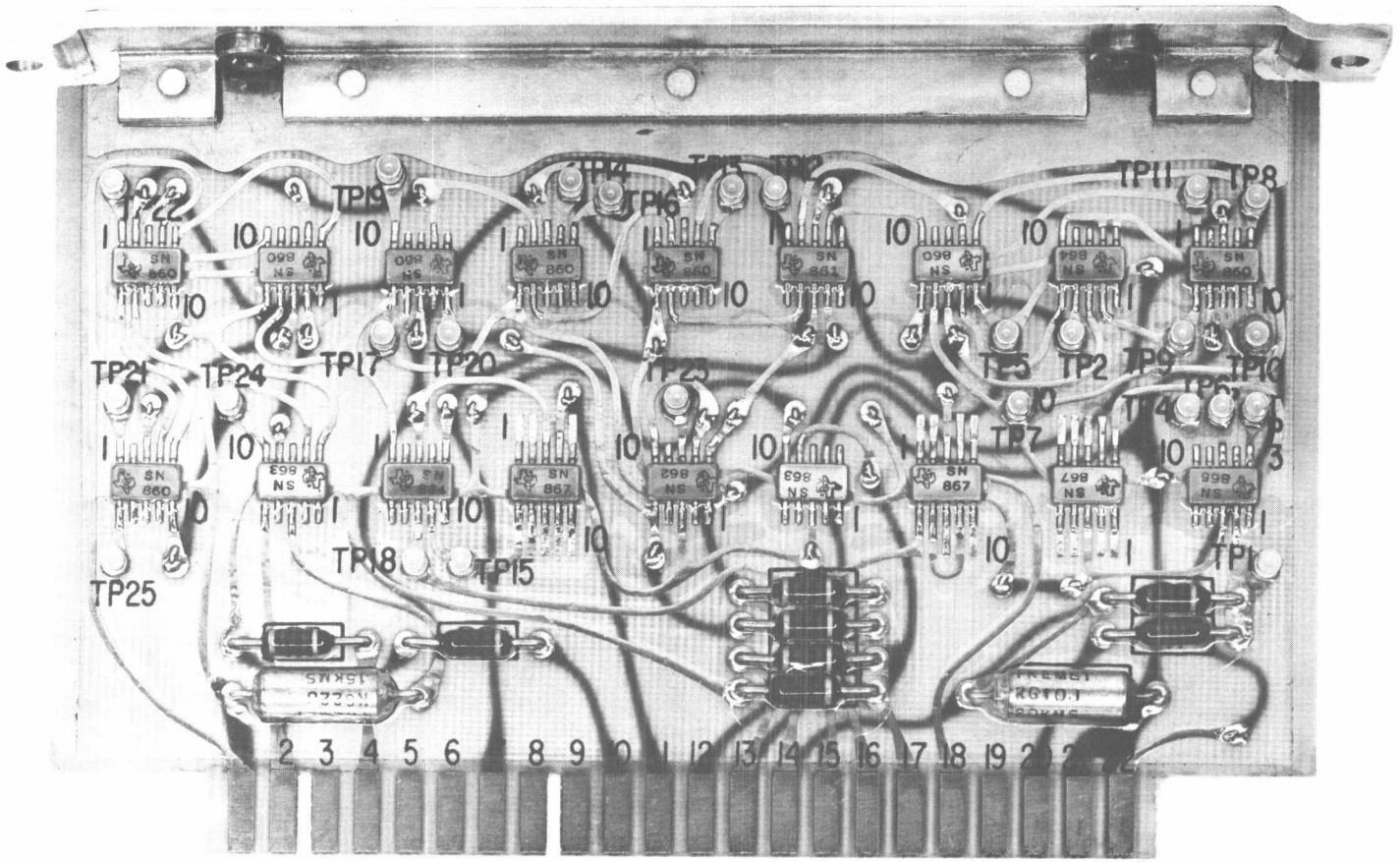


FIGURE 2-5

Encode and Timing Generator

converted information from the data register on the A/D Data Control module to an output data shift register on the Frame Sync-Data Output board. In addition to the transfer pulse, a second timing pulse (ENCODE) is generated. The ENCODE pulse clears the A/D data register, resets the A/D shift register, and starts the conversion sequence of new input data.

2.2.5 FRAME SYNC - DATA OUTPUT (Figure 2-6)

This board furnishes the Frame Sync word (10111000) every sixth word time. The function of the Frame Sync word is to provide a basis for synchronization when decommutating the serial telemetry data transmitted to a ground station. An 8-bit flip-flop shift register is contained on this board to provide the formatted serial data output to two redundant data output buffer drivers. The data is transmitted in a phase modulated (split phase) waveform as shown in Figure 2-7.

2.2.6 DC/DC CONVERTER NO. 1 (Figure 2-8)

This board is one of two power supply boards which provides the secondary voltage levels. The voltage levels used in the MRIR unit are +3.2 volts, +6 volts, -6 volts, -12 volts, and -18 volts. Contained on this board are the primary power relay, DC/DC converter oscillator, power transformer, and secondary voltage diode rectifiers. The DC/DC No. 1 board was designed so that all oscillating signals would be confined primarily to this board and not be coupled into the wiring harness by sending the oscillating signals to another board for conditioning.

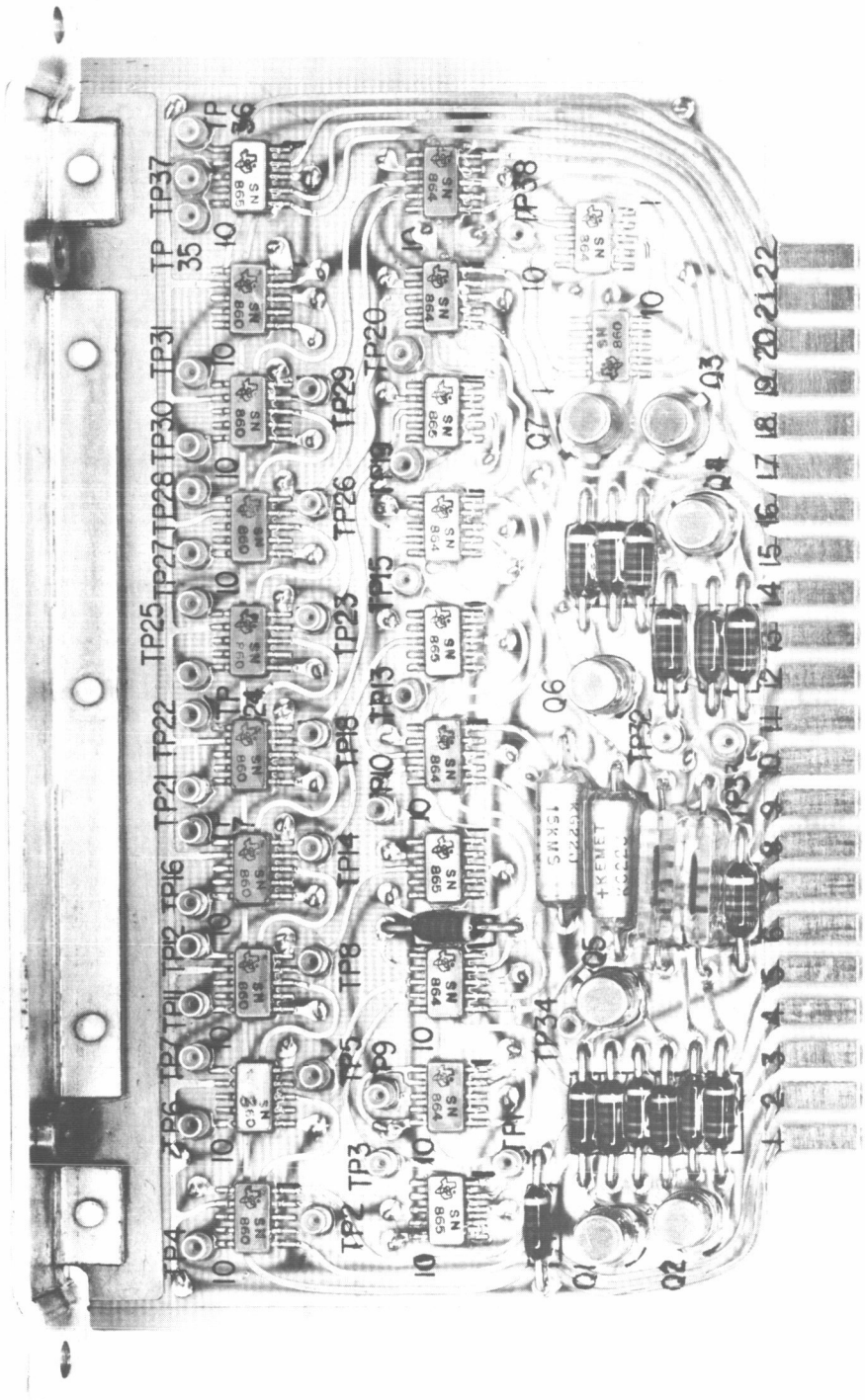


FIGURE 2-6

Frame Sync and Data Output

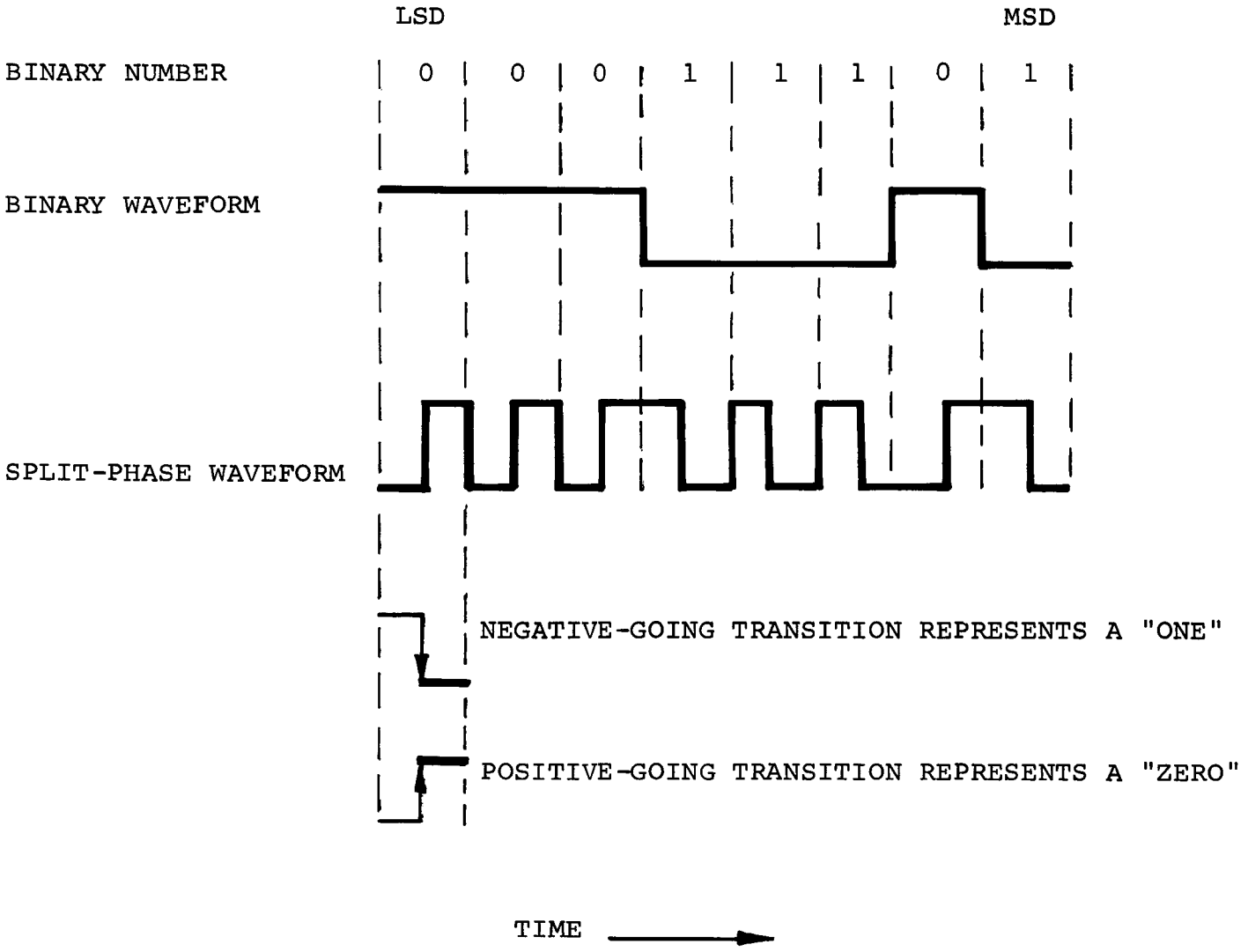


FIGURE 2-7

Phase Modulated (Split-Phase) Waveform

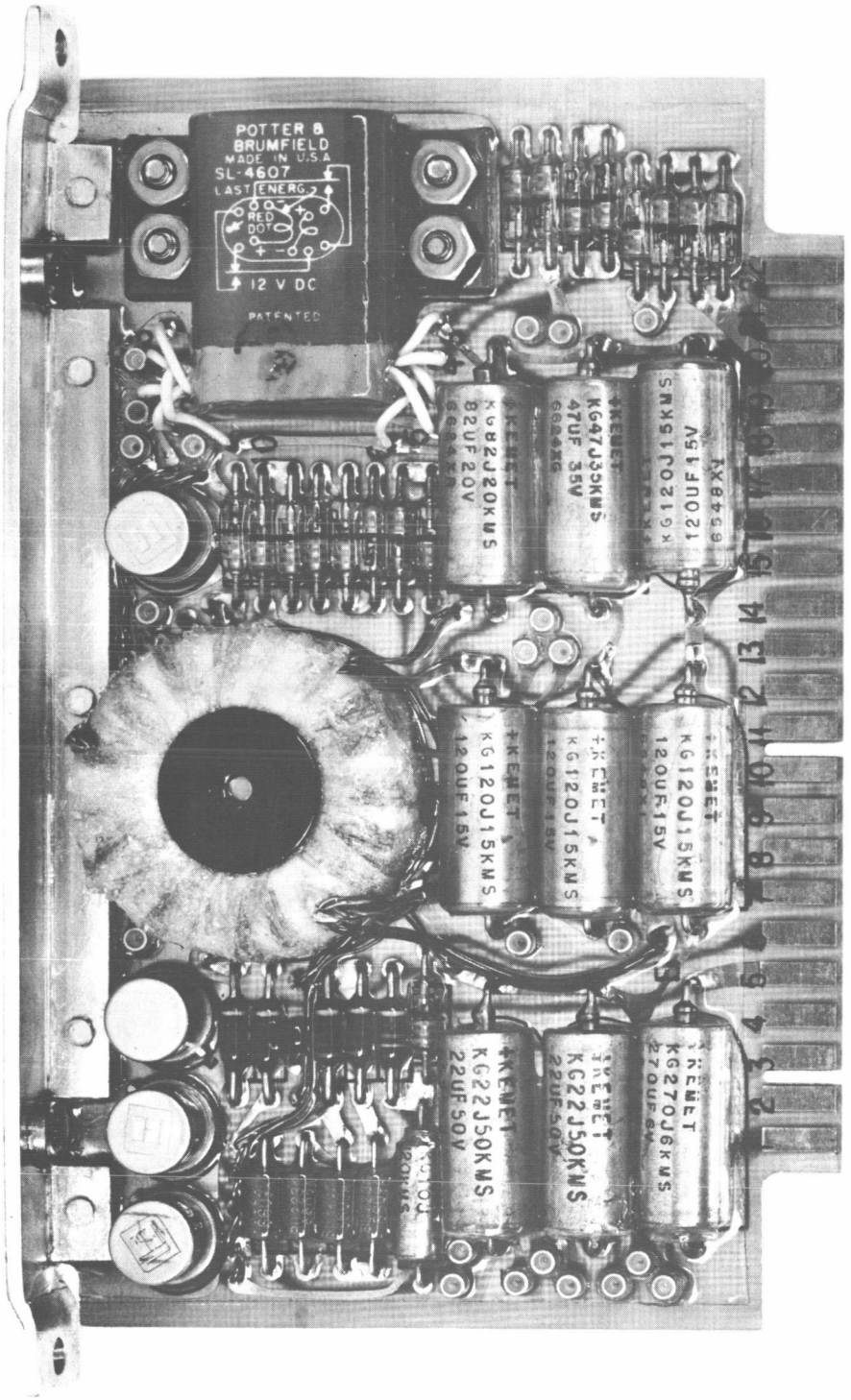


FIGURE 2-8

DC/DC Converter No. 1

2.2.7 DC/DC CONVERTER NO. 2 (Figure 2-9)

The second half of the two power supply boards contains the primary power input filter network, voltage regulator, secondary level output filters, and telemetry monitoring circuits.

2.3 ELECTRONIC COMPONENTS

In order to establish a high degree of operational reliability, all electronic components used in the MRIR Prototype and Flight units were screened according to procedures documented in GSFC Specifications S-450-P3 and S-450-P4.

2.3.1 SELECTION AND QUALIFICATION

All components were selected on the basis of their high reliability classification. Wherever possible, components were procured from the vendor or manufacturer to meet the requirements of the previously mentioned specifications. When this was not feasible, the "hi-rel" components were subjected to the requirements of the previously mentioned specifications for qualification at this contractor's facility. Special components or components difficult to obtain within the allocated time were furnished from NASA stock as GFE. Prequalified components and those received as GFE were selectively sampled to satisfy operational and electrical characteristics.

2.3.2 REPORTS

A complete report on the electrical conditioning of all components at this contractor's facility is documented in CalComp report DO301-016 entitled "Component Burn-In Report for NIMBUS B MRIR Digital Electronics Telemetry Unit."

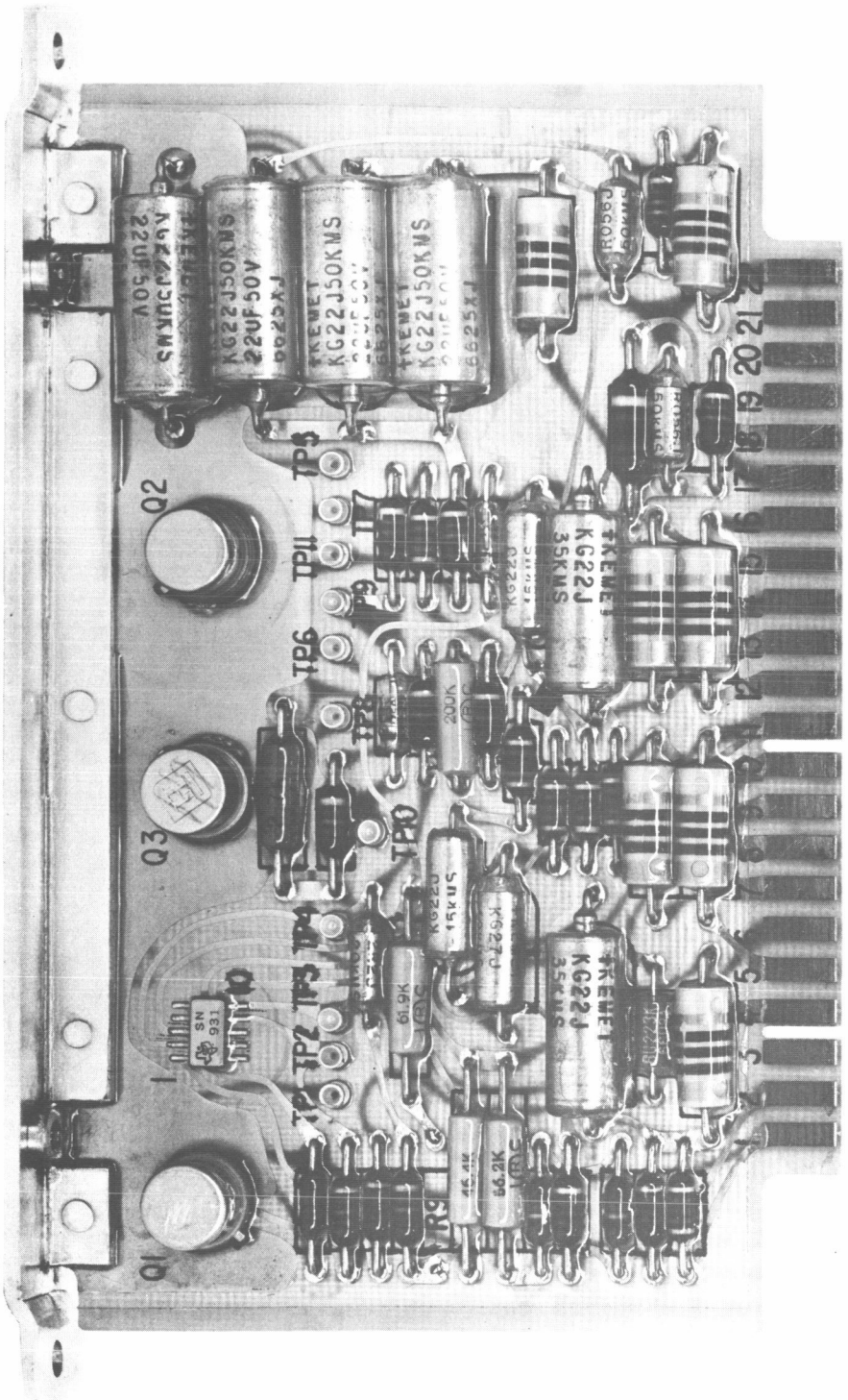


FIGURE 2-9

DC/DC Converter No. 2

SECTION 3

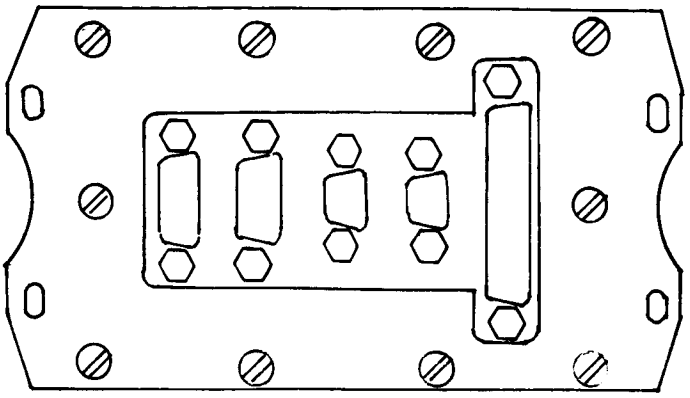
MECHANICAL DESIGN

3.1 PACKAGE CONFIGURATION

The layout of the Prototype and Flight Model MRIR-T/ME units is identical to the design employed in the engineering model, shown in Figure 3-1. This configuration offers a good heat-sink for any heat generating components. This layout also affords shielding capabilities against possible crosstalk and isolates logic modules from the possible stray magnetic fields produced by the DC/DC converter oscillator.

The entire assembly is machined from ZK60A-T5 magnesium alloy. All parts received a coating of Dow 23 Stannate Immersion Treatment for Magnesium to protect the magnesium from corrosion due to high humidity environments. Application of this coating is per Dow Chemical Company, Bulletin 147-22 conforming with the General Electric document issued on this same subject.

Fabrication of the assembly presented no problems and all components fit without modification. The final package size conforms to a standard 2 over 0 which is 6 x 4 x 6.5 inches. Five input/output connectors identified J1 to J5 are provided on the top mounting plate of the assembly. Identification and function of each connector is indicated in Figure 3-1 and accompanied by Table 3-1.



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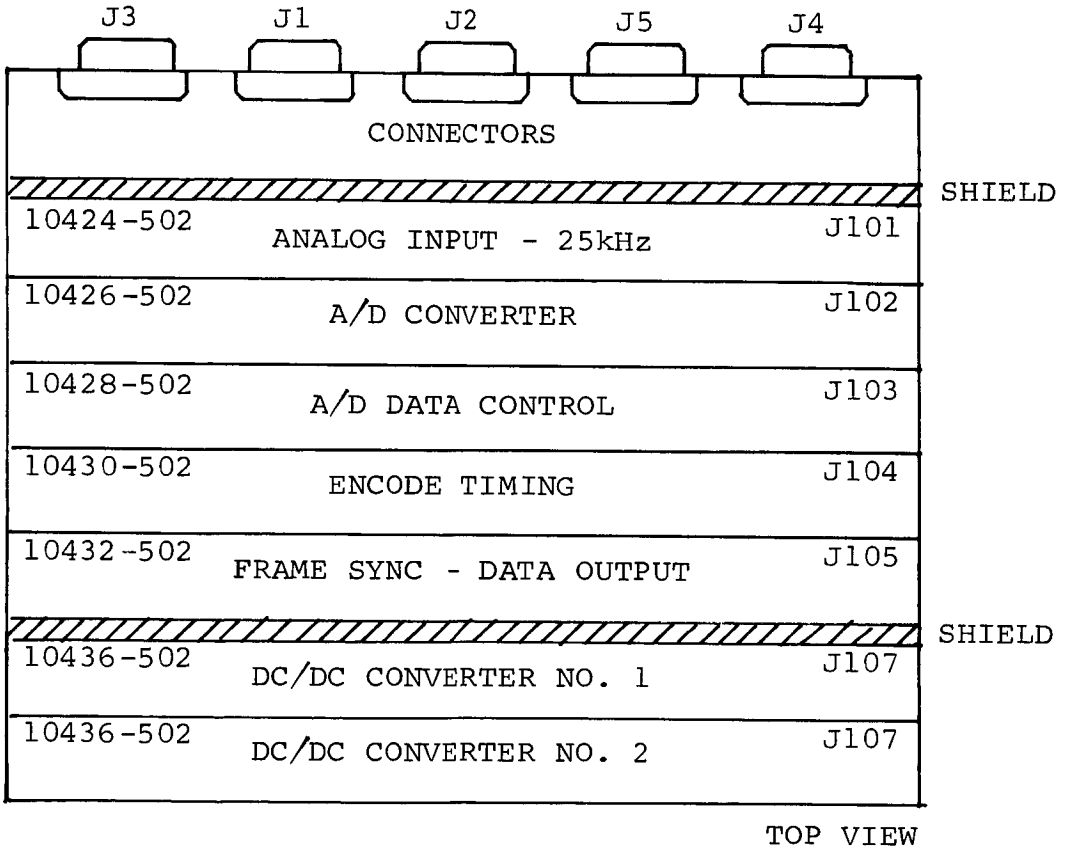


FIGURE 3-1

Connector and Circuit Board Location

A complete set of mechanical and assembly drawings for the delivered units is provided in Appendix B.

3.2 PHYSICAL CHARACTERISTICS

3.2.1 WEIGHT

The weight of the completed Prototype and Flight model MRIR-T/ME units is listed in Table 3-2.

3.2.2 CENTER OF GRAVITY

Table 3-2 indicates the center of gravity of the Prototype and Flight units measured as shown in Figure 3-2.

3.2.3 POWER DISSIPATION

The power dissipated by each unit was monitored during the environmental qualification tests. The maximum power dissipation was found to be at the lowest temperature excursion or $-5^{o}C$. At this temperature the dissipation of each unit was typically 1.45 watts with -24.5 volts input.

3.3 DESIGN RECOMMENDATIONS

The mechanical design configuration of the MRIR-T/ME unit is satisfactory with the exception of the magnesium protective coating, Dow 23. It was discovered, after subjecting the subassemblies to humidity tests, that the Dow 23 coating did not offer sufficient corrosive protection to the magnesium against the specified humidity. Excessive scale and residue built up on surfaces in direct exposure to the environment. No noticeable corrosion was present within enclosed areas of the subassembly.

TABLE 3-1

Input/Output Connectors

Connector	Number of Pins	Signals
J1	15-pin Plug	Power Input and Commands
J2	9-pin Socket	Output Signals
J3	15-pin Socket	Input Signals
J4	37-pin Socket	Telemetry and Bench Test Equipment Test Point
J5	9-pin Plug	Input Clock Signals

TABLE 3-2

Weight and Center of Gravity

Unit Designation	S/N	Weight (pounds)	C.G. Location (inches)		
			X	Y	Z
Prototype	P002	4.77	2.045	2.990	3.192
Flight No. 1	F003	4.65	2.045	2.990	3.192
Flight No. 2	F004	4.62	2.045	2.990	3.192

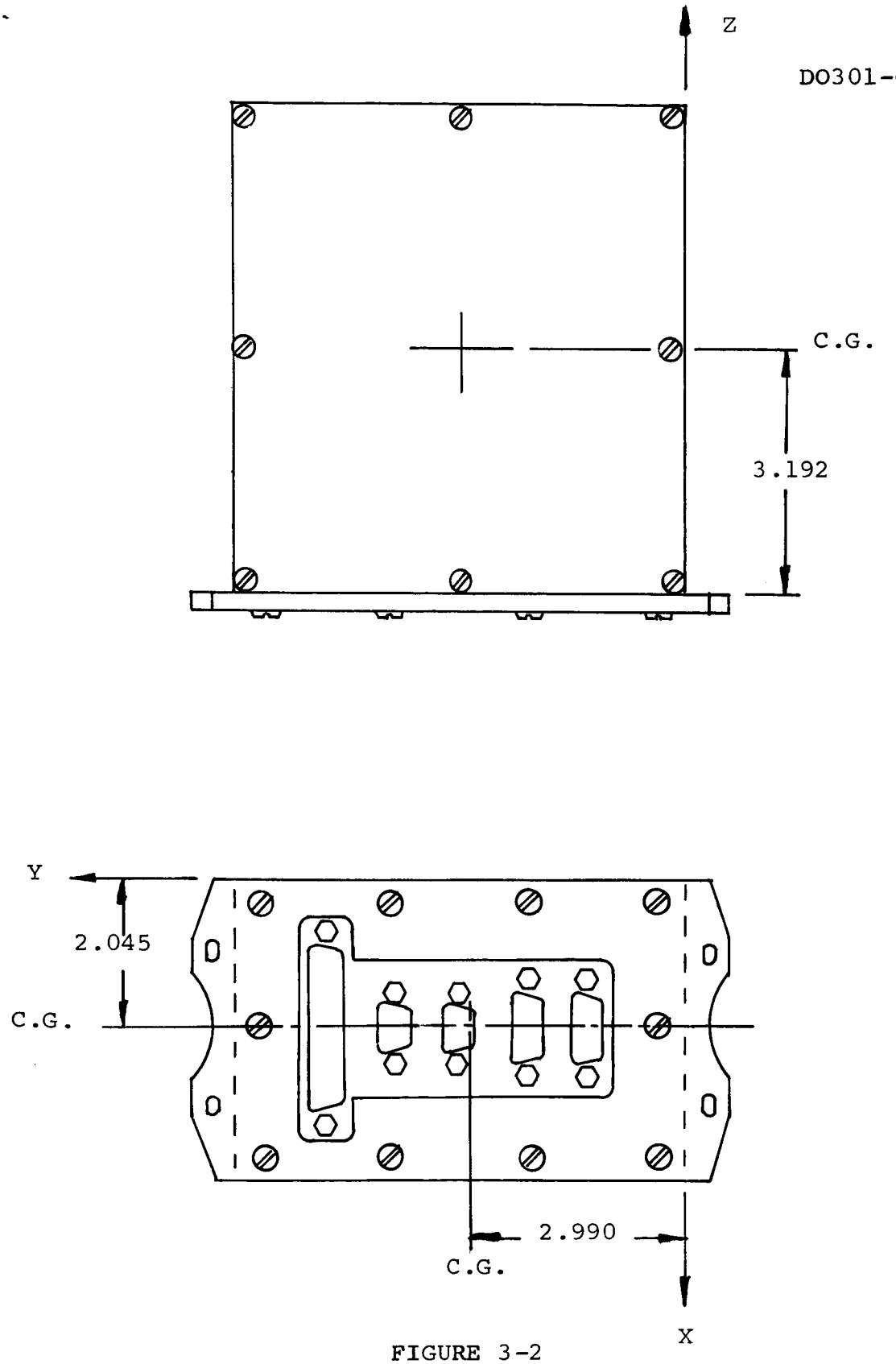


FIGURE 3-2

MRIR Telemetry Unit
Center of Gravity Configuration

In future programs, it is recommended that this type of protective coating be eliminated due to its relatively poor protective qualities and substitued with electrolysis nickel or some other suitable form of protective material.

SECTION 4

QUALIFICATION AND SYSTEM TEST

4.1 GENERAL

Tests required to qualify the Prototype and Flight model MRIR-T/ME units are documented in GSFC Specification S-653-P14 and CalComp document A0401-005. The degree and severity of testing varies for the Prototype and Flight units, the Flight unit being subjected to environments more closely resembling those encountered during launch and orbit. All system testing was performed using Bench Test Equipment identical to that used for the engineering model. Figures 4-1 and 4-2 indicate the configuration of this equipment.

4.2 MRIR-T/ME INTERFACE

The interface list for the Prototype and Flight model subassemblies is listed in Appendix C. This list defines the electrical term contained on each connector pin. Voltages and impedances are given where applicable on connection pins which either originate or terminate on the telemetry electronics unit.

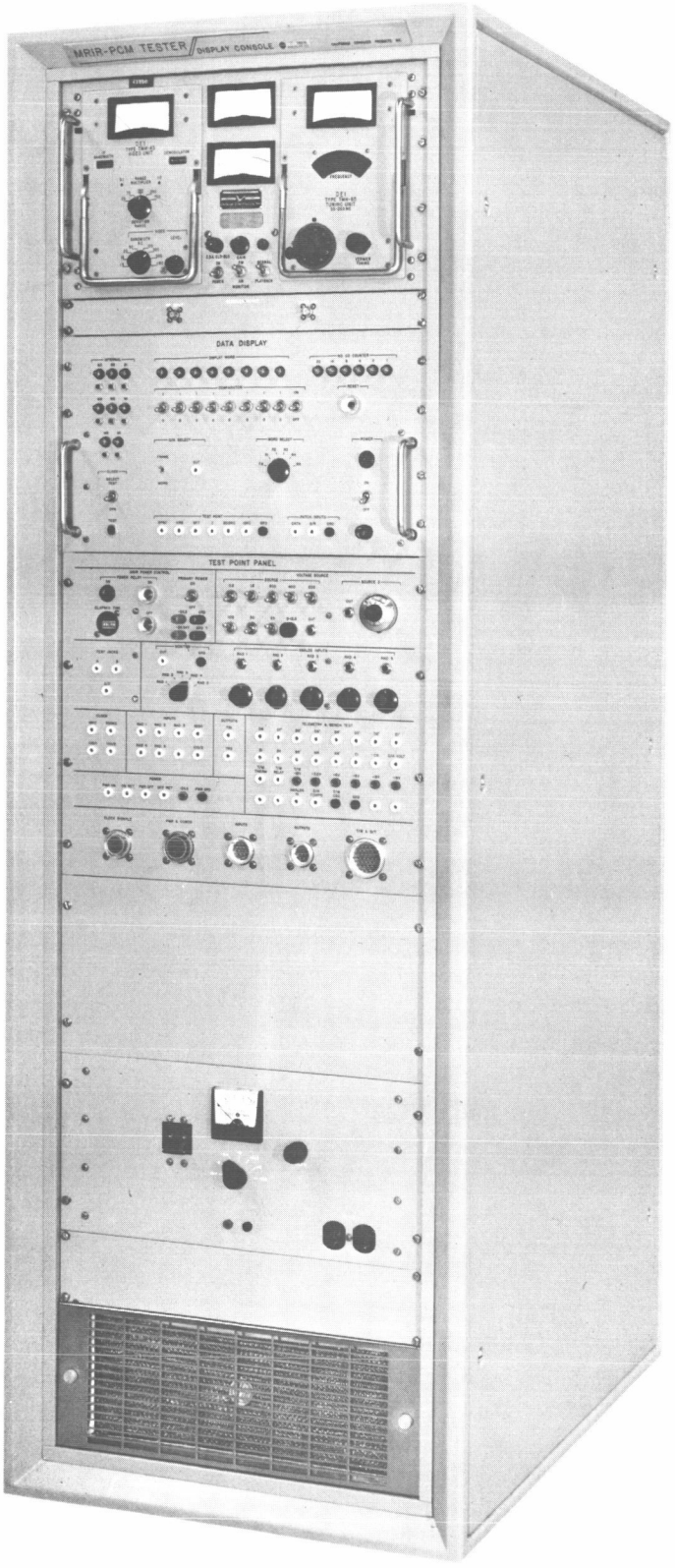


FIGURE 4-1

MRIR Bench Test Equipment Display Console

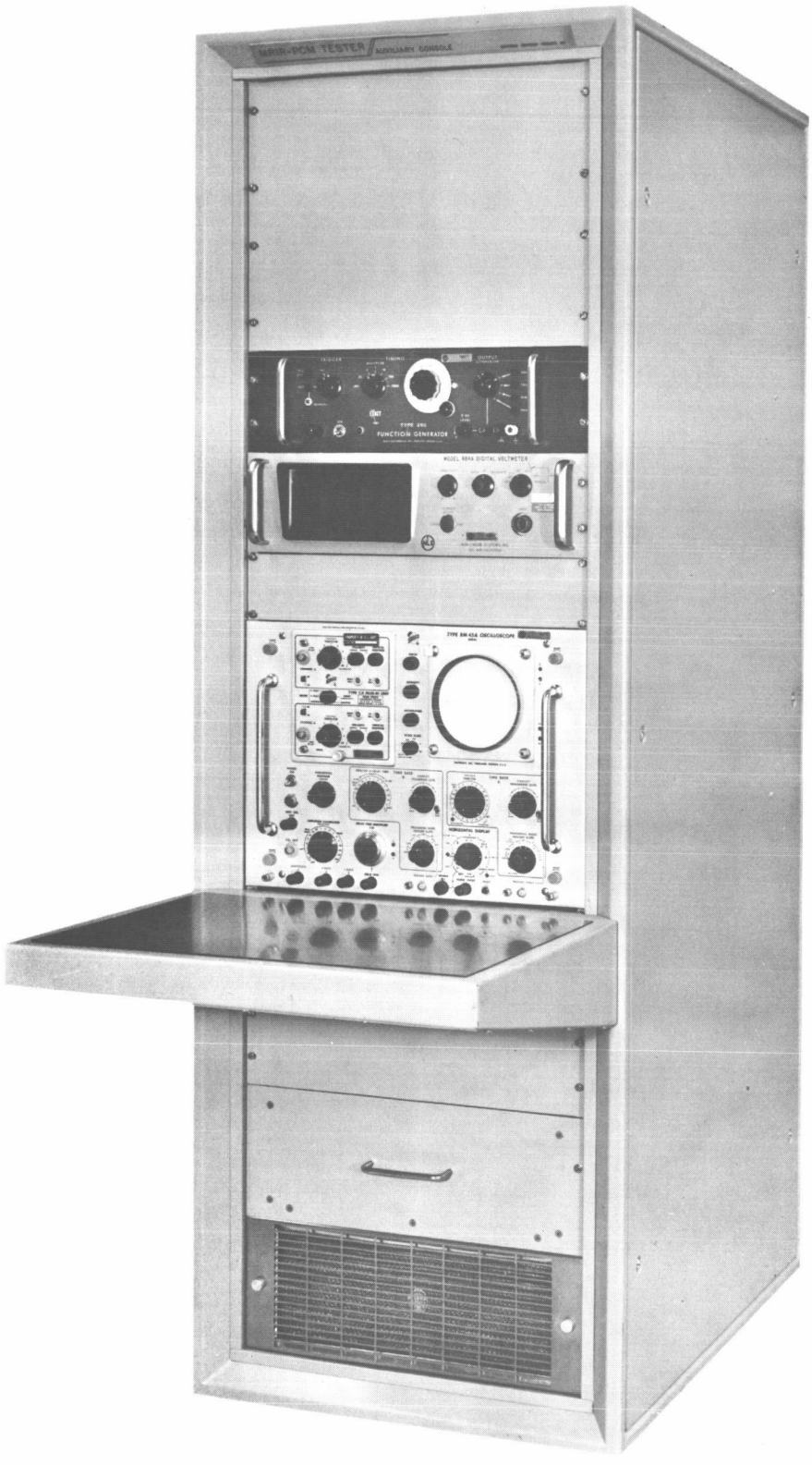


FIGURE 4-2

MRIR Bench Test Equipment Auxiliary Console

4.3 PRINTED CIRCUIT BOARD INTERCONNECTION DIAGRAM

An interconnection diagram or pin chart is included in Appendix D. This chart provides the term designation for each circuit board connection and indicates the routing of this term by connector/pin designation numbers.

4.4 SIGNAL FLOW DIAGRAM

Figure 4-3 shows the signal flow and grounding scheme employed in the MRIR-T/ME unit.

4.5 TIMING CHART

Figure 4-4 indicates the timing of all logical functions of the MRIR-T/ME unit.

4.6 ENVIRONMENTAL QUALIFICATION RESULTS

Data gathered as a result of environmental testing is tabulated in two separate reports. These publications are:

- DO401-024, "Environmental Test Report for Prototype MRIR Digital Electronics Unit," 30 December 1966.
- DO401-026, "Environmental Test Report for Flights No. 1 and No. 2, MRIR Digital Electronics Unit," 30 January 1967.

For convenience, the temperature-telemetry calibration curves and the analog-to-digital calibration charts for each unit are included in Figures 4-5 through 4-7 and Tables 4-1 through 4-6.

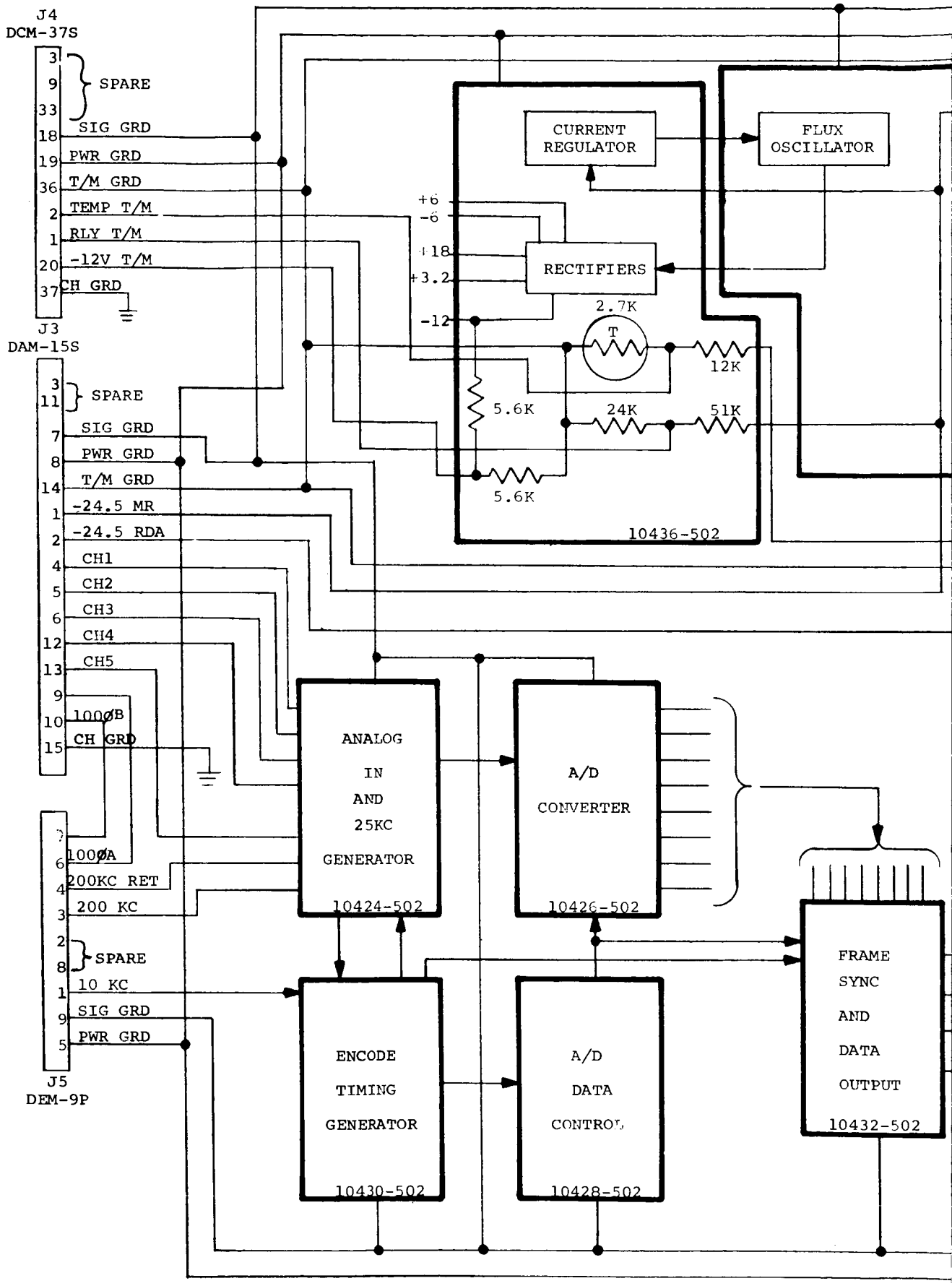
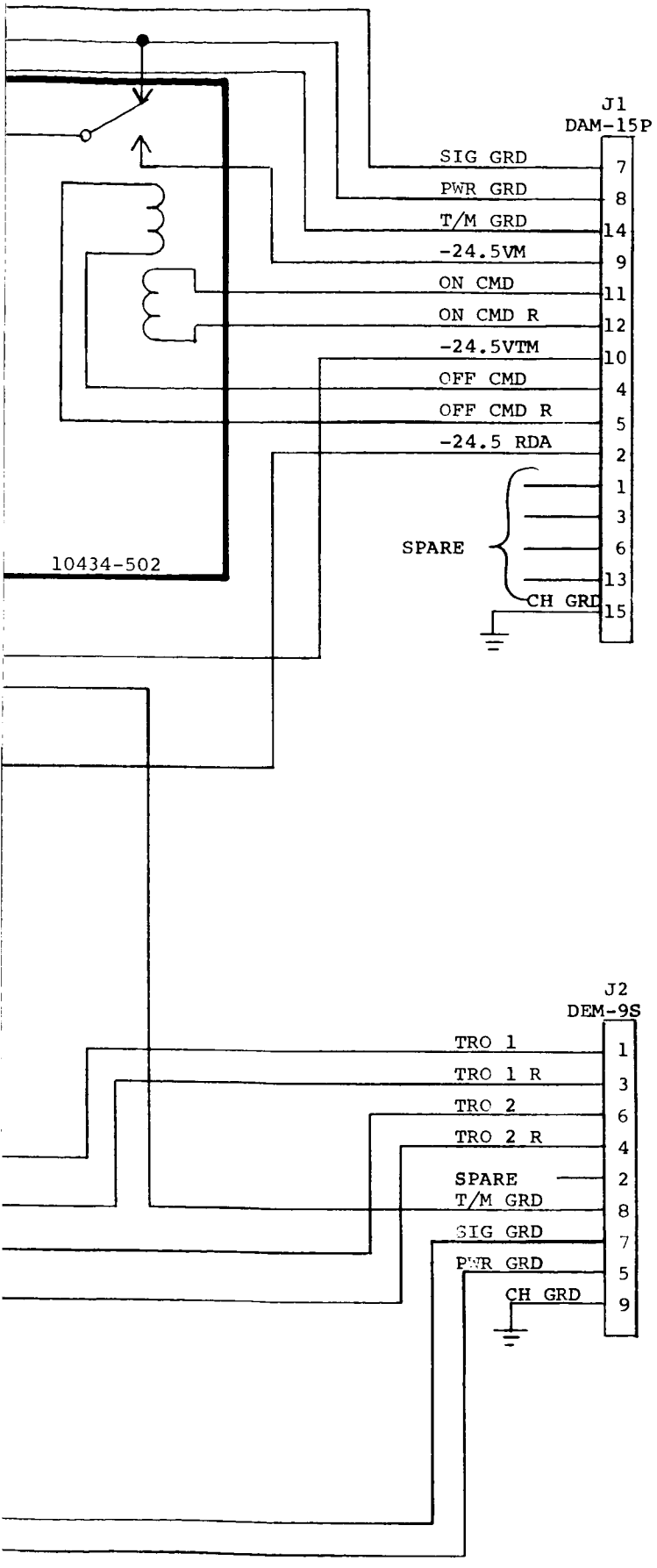


FIGURE 4-3

Signal and Grounding Schematic Dia
MRIR-PCM Unit

FOLDOUT FRAME 1



gram

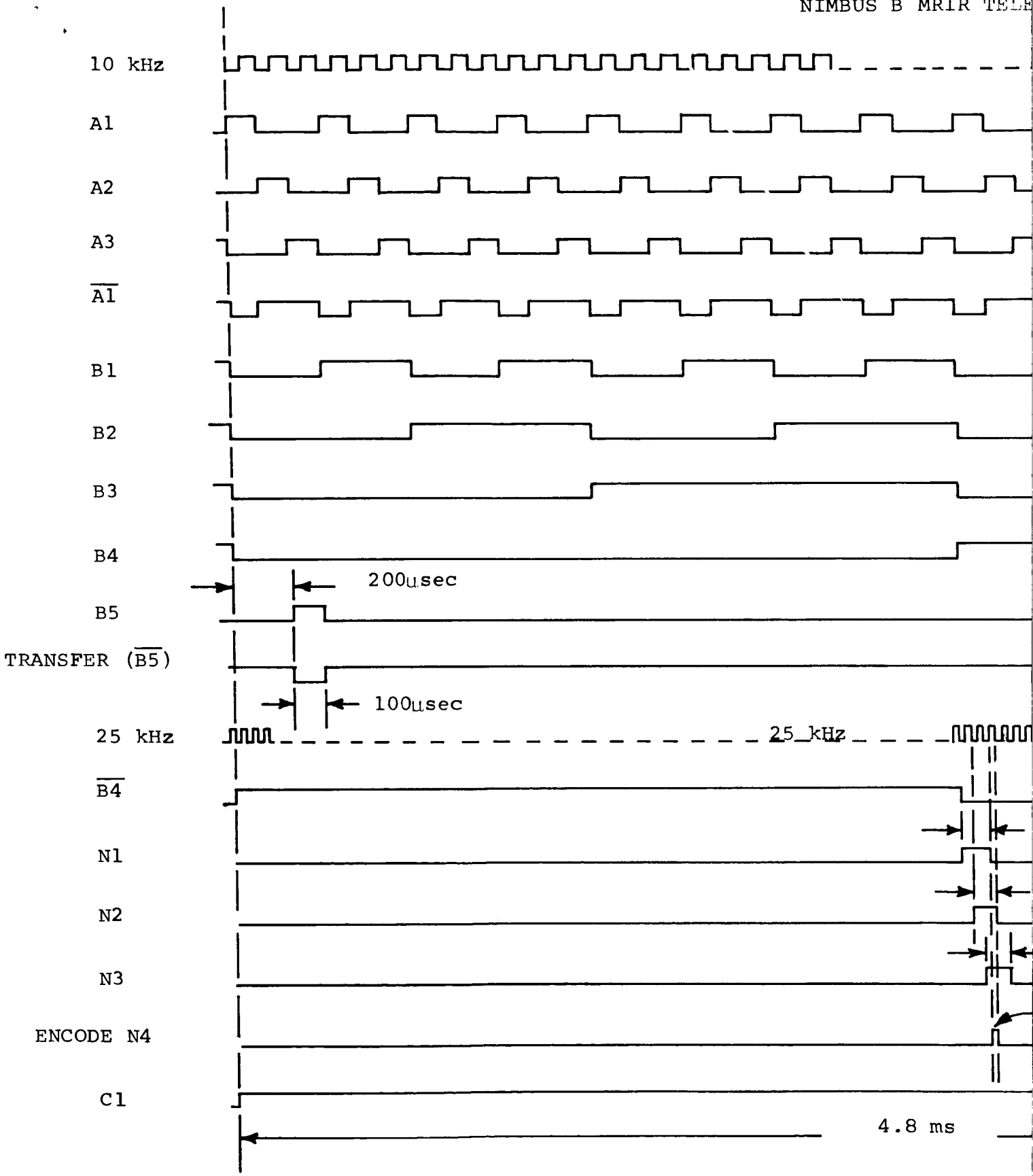
FOLDOUT FRAME 2

1

FIGU

TIMI

NIMBUS B MRIR TELE

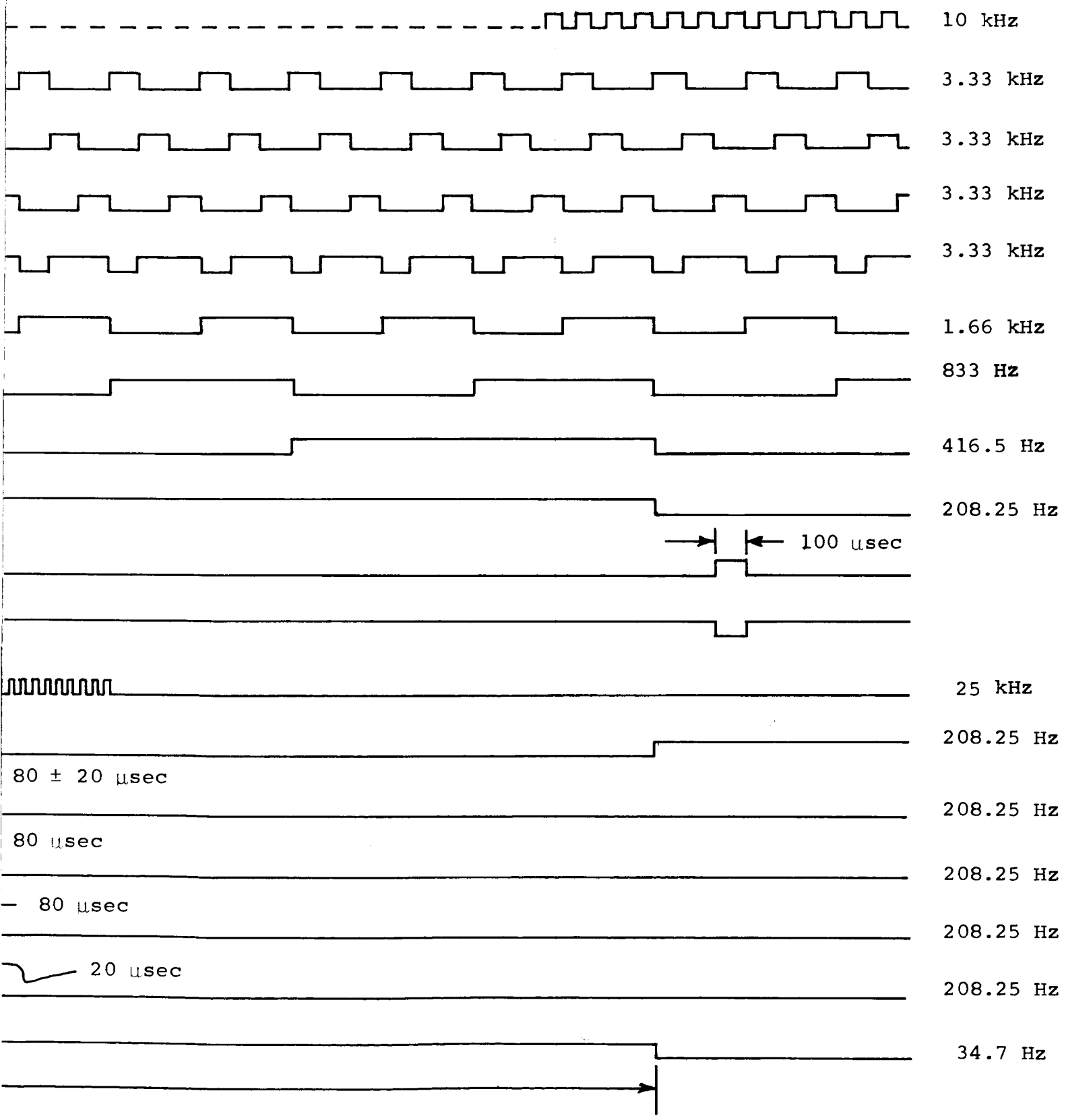


FOLDOUT FRAME /

URE 4-4

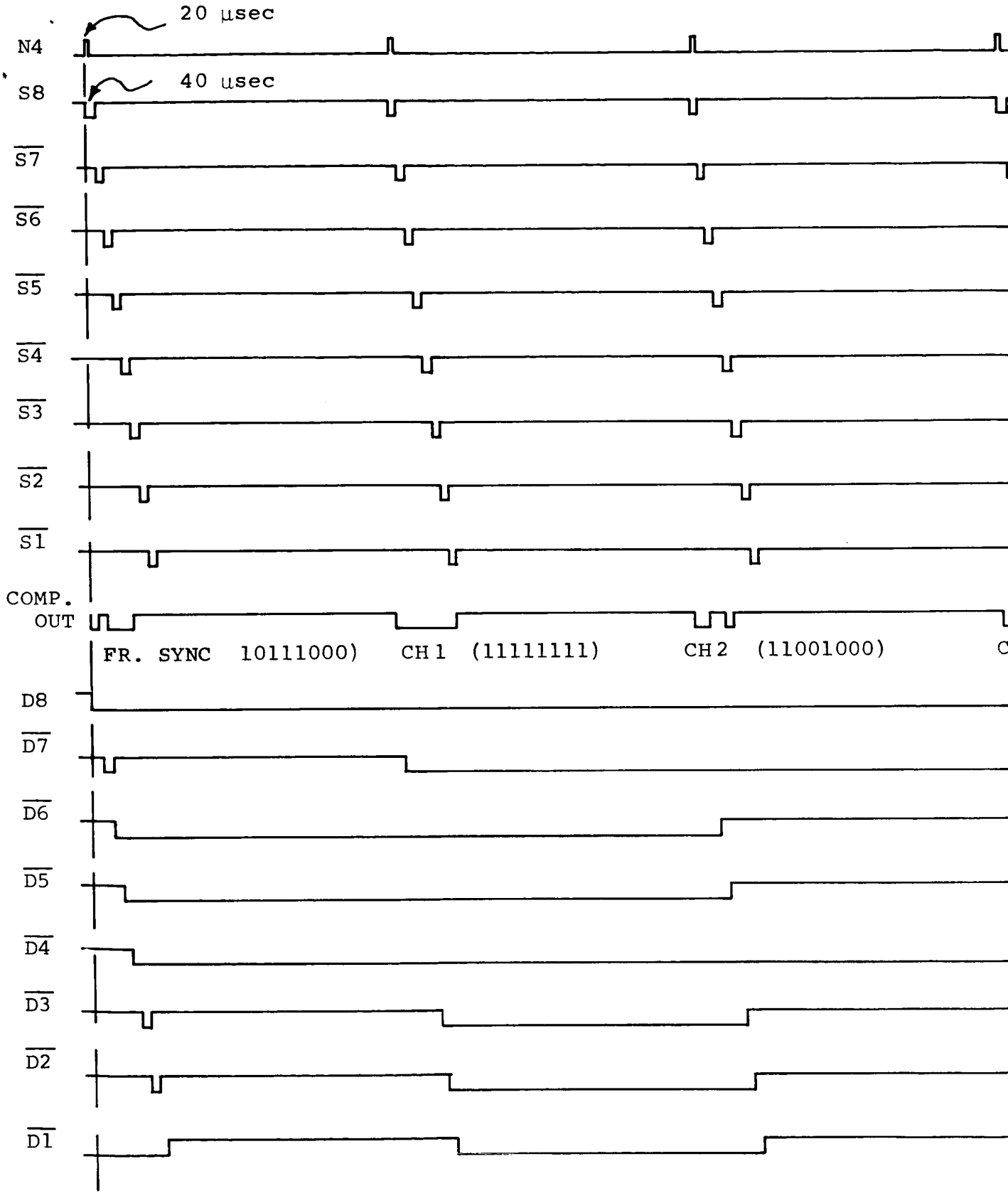
NG CHART

METRY ELECTRONICS UNIT DO301-019



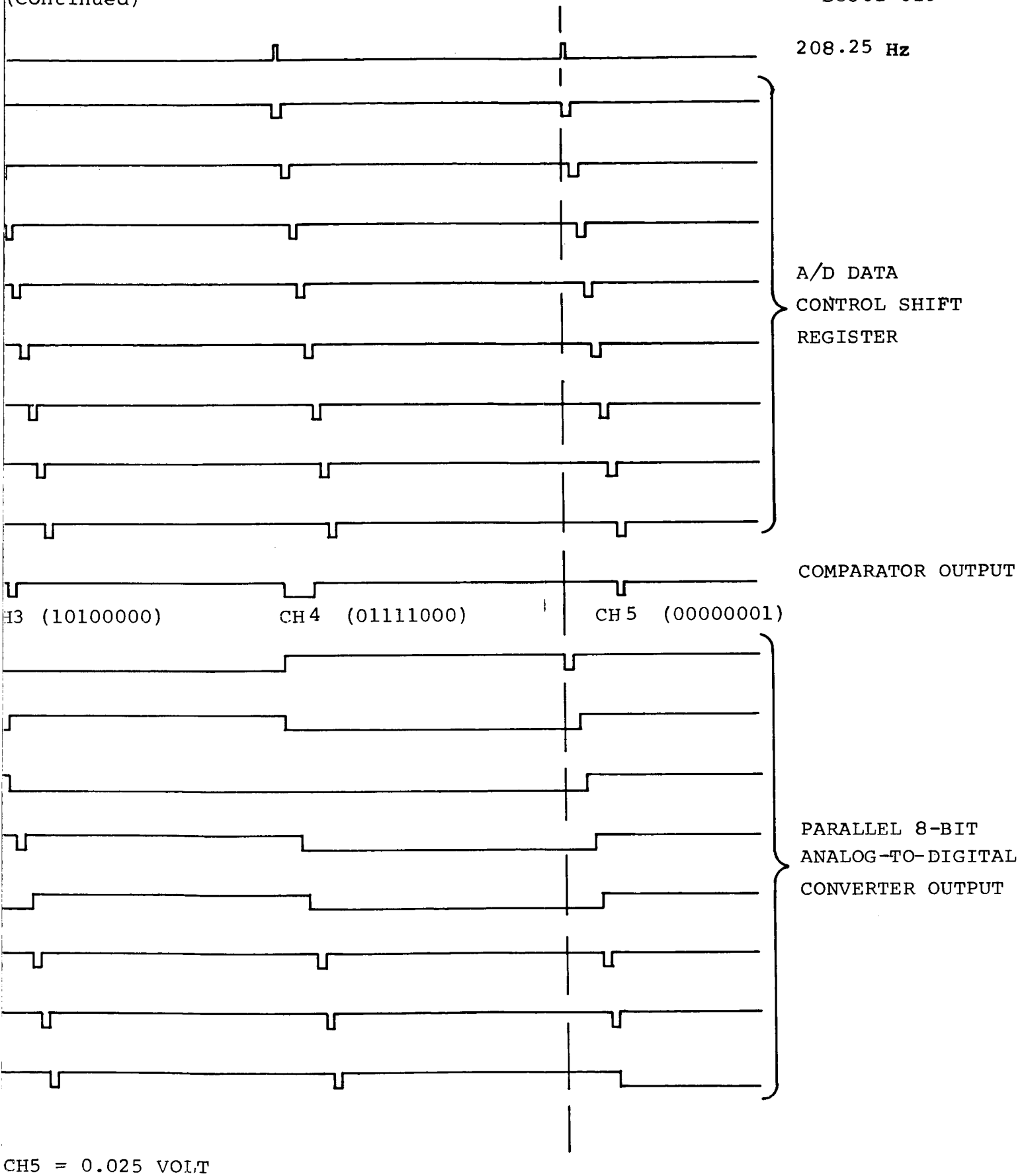
FOLDOUT FRAME

FIGURE 4-4



NOTE: CH1 = 6.375 VOLT, CH2 = 5.0 VOLT, CH3 = 4.0 VOLT, CH4 = 3.0 VOLT,

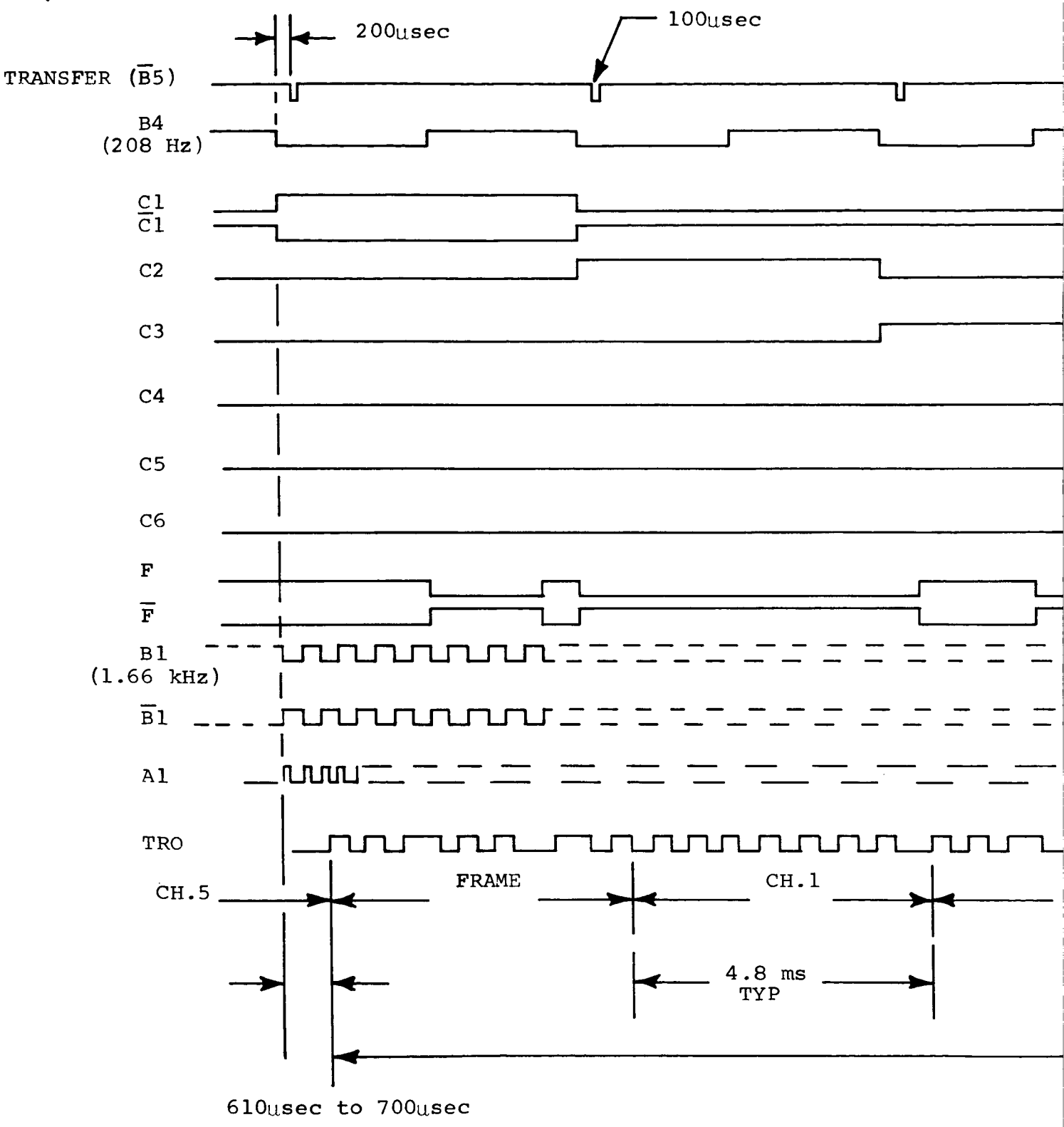
FOLDOUT FRAME 1



CH5 = 0.025 VOLT

FOLDOUT FRAME

FIGURE 4

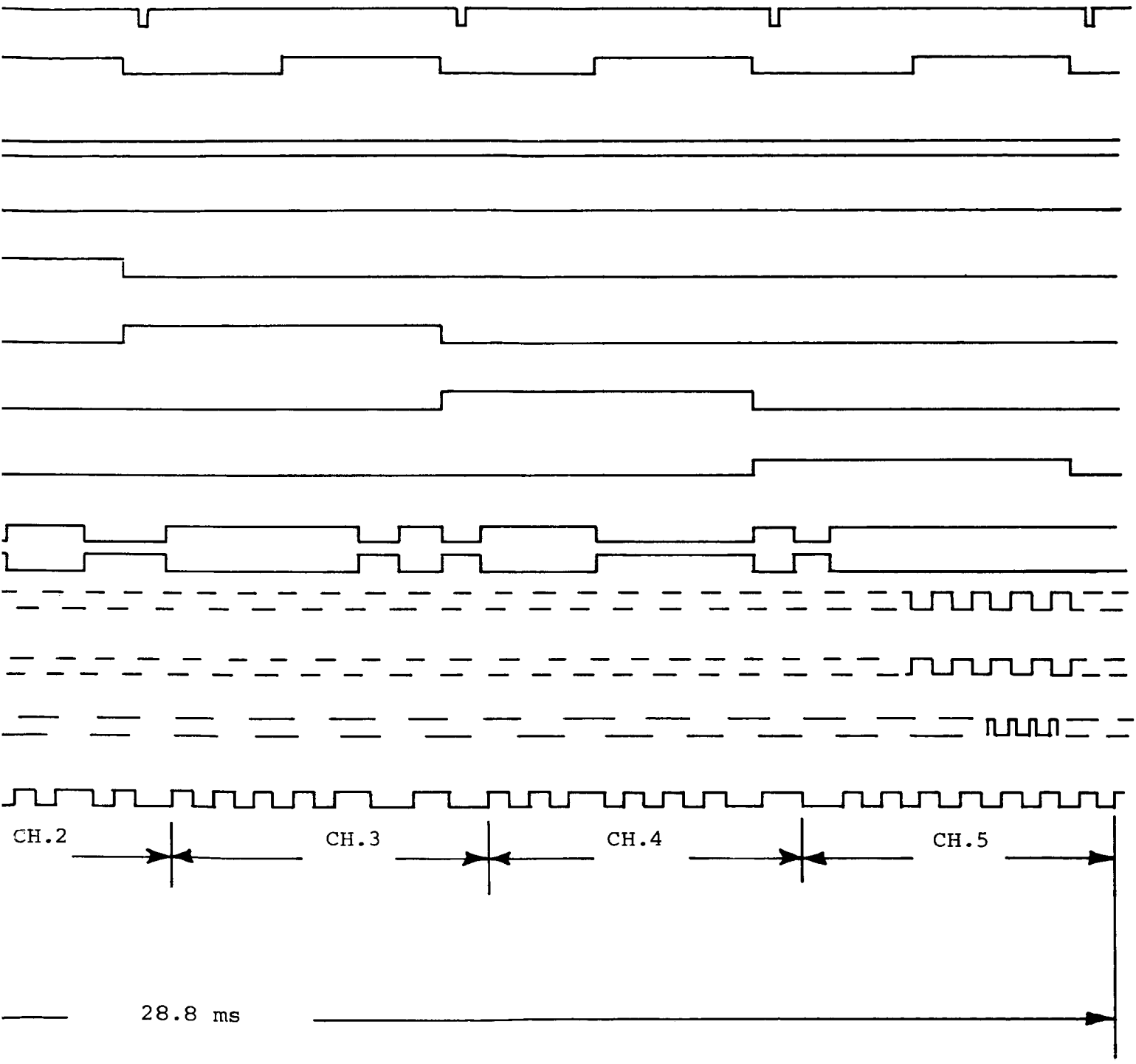


F = SERIAL DATA OUTPUT

TRO = SPLIT PHASE SERIAL OUTPUT TO TAPE RECORDER

FOLDOUT FRAME /

DO301-019



FOLDOUT FRAME 2

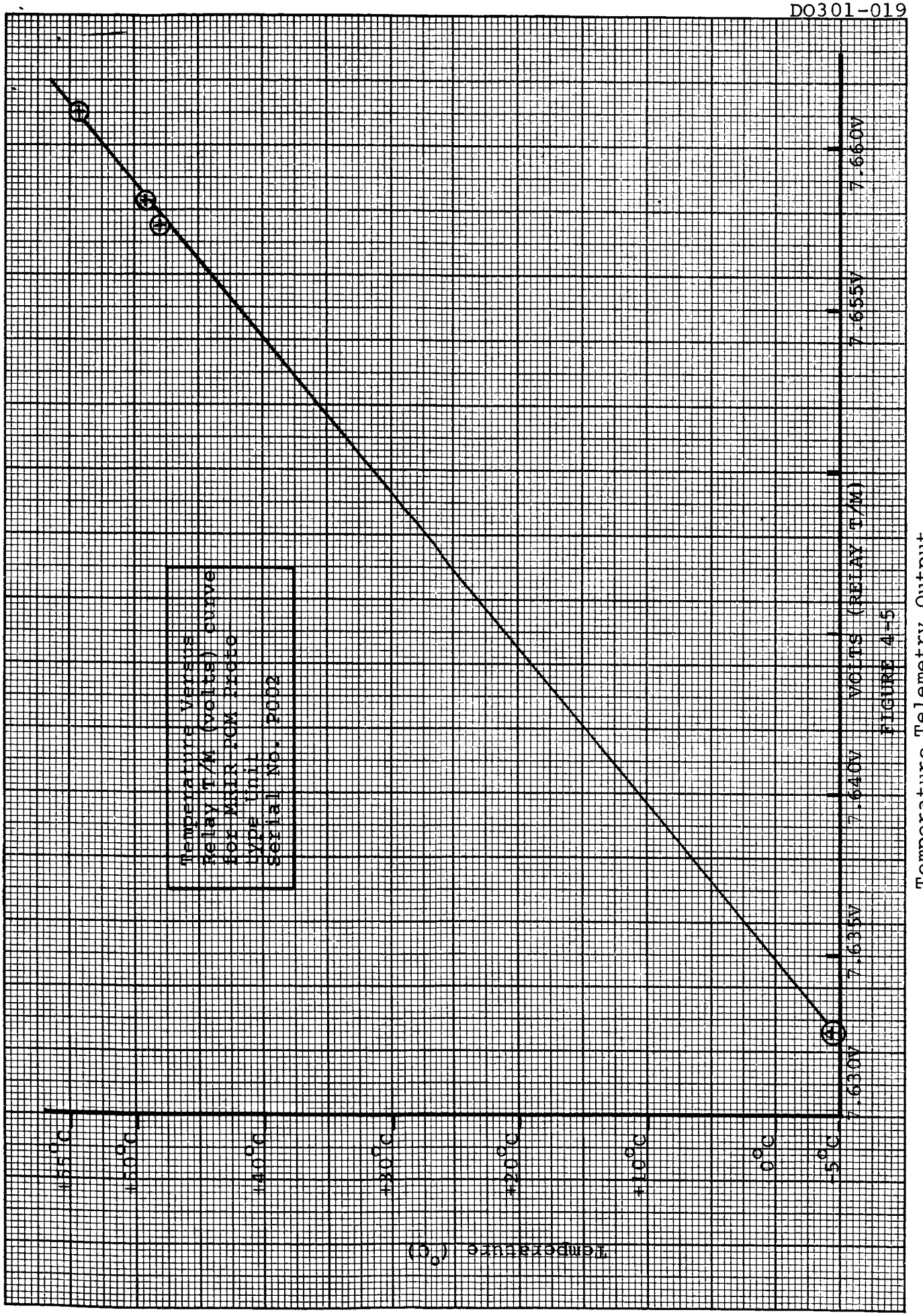


FIGURE 4-5

Temperature Telemetry Output

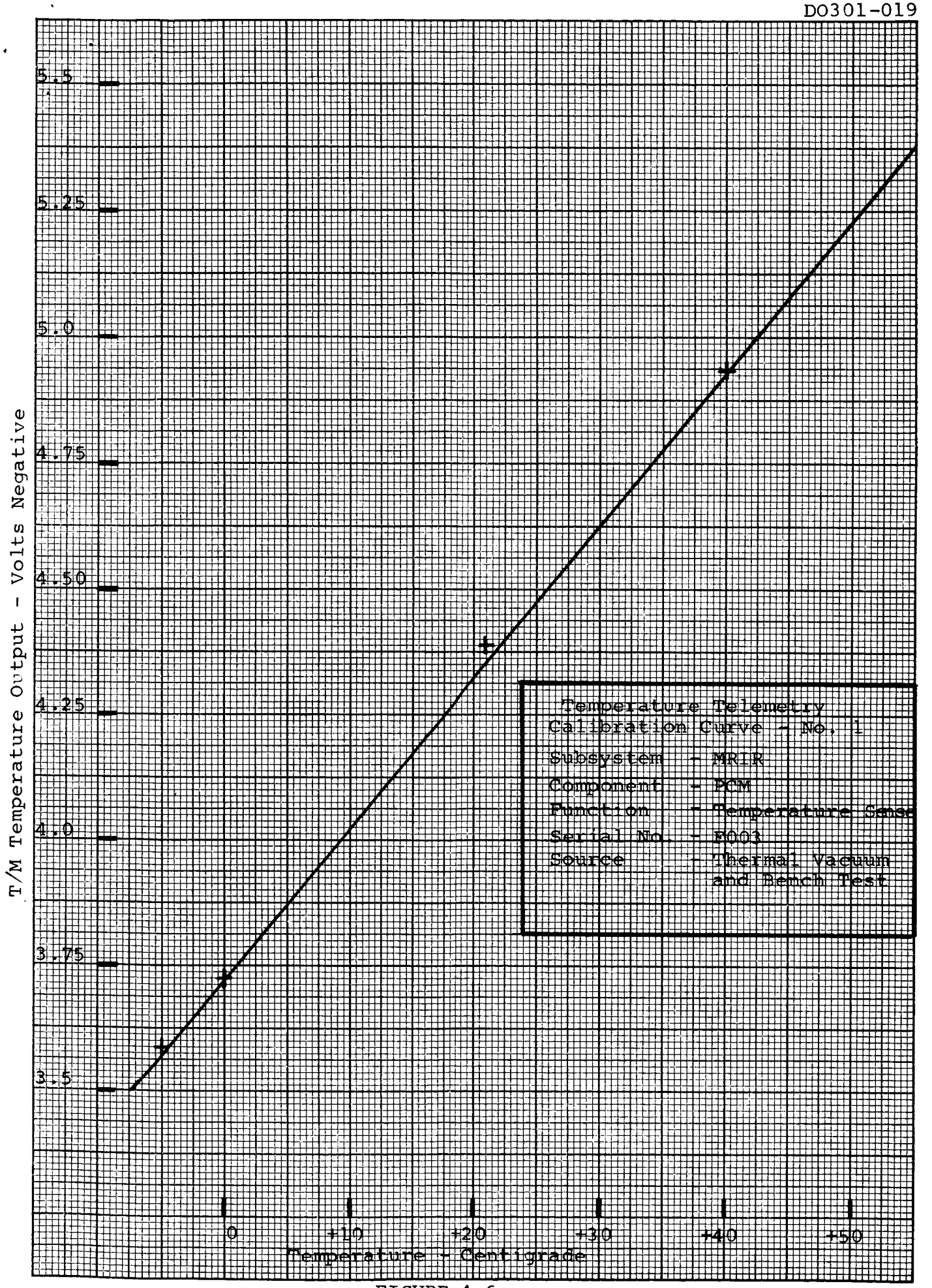


FIGURE 4-6
Temperature Telemetry Output

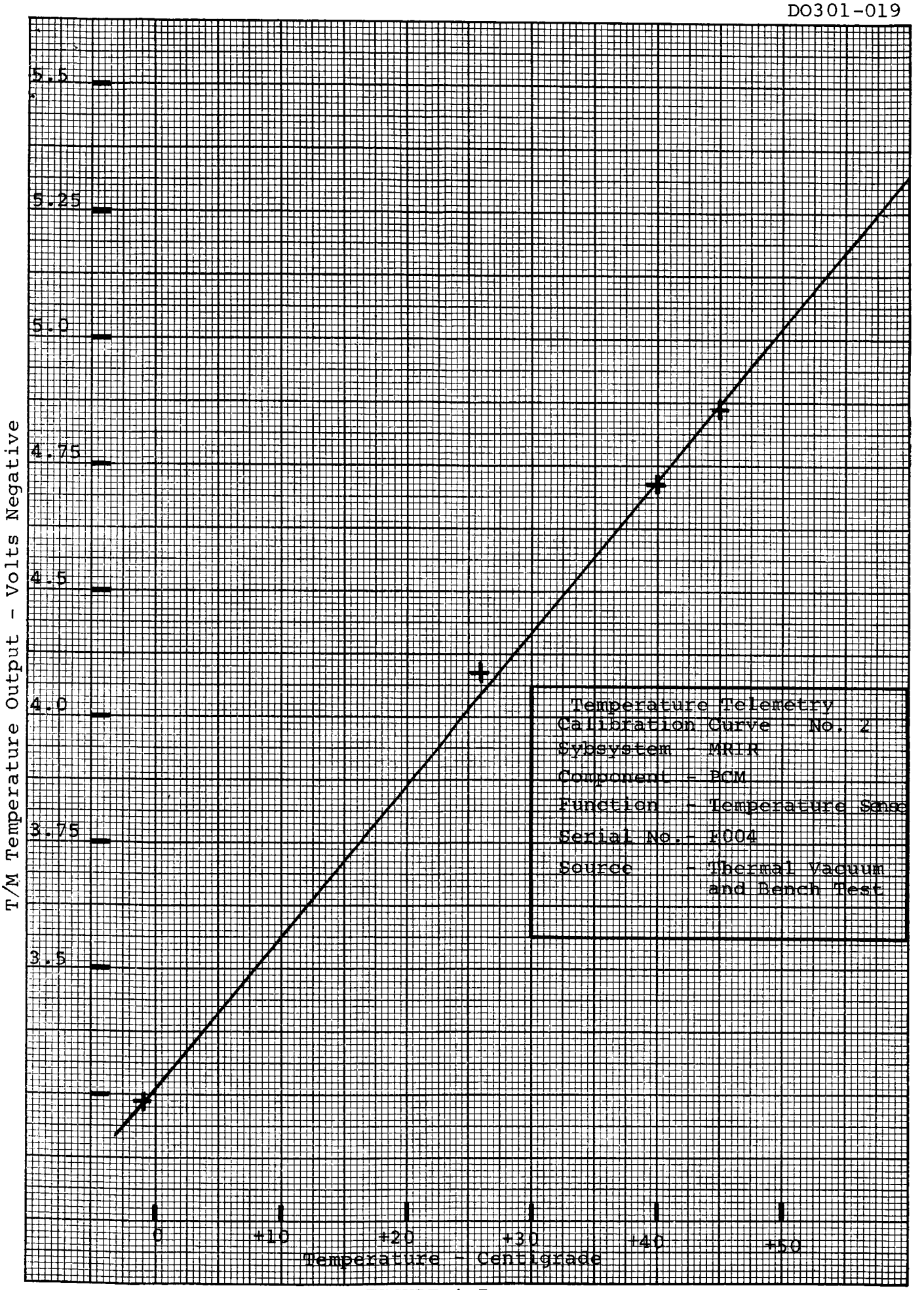


FIGURE 4-7

Temperature Telemetry Output

TABLE 4-1

Prototype Serial No. P002
Analog/Digital Conversion at -5°C

Bit	Voltage Step(mv)	Channel 1 (mv)	Channel 2 (mv)	Channel 3 (mv)	Channel 4 (mv)	Channel 5 (mv)
2^0	25	22	22	22	22	23
2^1	50	48	48	48	48	48
2^2	100	98	98	98	98	98
2^3	200	198	199	199	199	199
2^4	400	399	399	399	399	399
2^5	800	800	800	800	800	800
2^6	1600	1600	1600	1600	1600	1600
2^7	3200	3198	3198	3199	3199	3198
$2^0+\cdots+2^7$	6375	6375	6376	6375	6375	6375

TABLE 4-2

Prototype Serial No. P002
Analog/Digital Conversion at +55°C

Bit	Voltage Step(mv)	Channel 1 (mv)	Channel 2 (mv)	Channel 3 (mv)	Channel 4 (mv)	Channel 5 (mv)
2^0	25	22	23	23	22	23
2^1	50	49	49	49	49	49
2^2	100	99	99	100	99	99
2^3	200	199	199	199	199	199
2^4	400	400	400	399	400	400
2^5	800	801	801	801	801	801
2^6	1600	1601	1601	1601	1601	1601
2^7	3200	3200	3199	3200	3199	3199
$2^0+\cdots2^7$	6375	6378	6378	6378	6378	6377

TABLE 4-3

Flight Unit No. 1, Serial No. F003
Analog/Digital Conversion at 0°C

Bit	Voltage Step (mv)	Channel 1 (mv)	Channel 2 (mv)	Channel 3 (mv)	Channel 4 (mv)	Channel 5 (mv)
2^0	25	23	24	24	24	24
2^1	50	48	48	48	48	48
2^2	100	97	98	97	98	98
2^3	200	198	198	198	198	198
2^4	400	398	398	398	398	398
2^5	800	797	797	797	798	797
2^6	1600	1598	1598	1598	1598	1598
2^7	3200	3198	3197	3197	3197	3197
$2^0+\cdots+2^7$	6375	6375	6375	6375	6375	6375

TABLE 4-4

Flight Unit No. 1, Serial No. F003
Analog/Digital Conversion at +60°C

Bit	Voltage Step (mv)	Channel 1 (mv)	Channel 2 (mv)	Channel 3 (mv)	Channel 4 (mv)	Channel 5 (mv)
2^0	25	23	23	24	23	24
2^1	50	47	47	47	47	47
2^2	100	96	97	97	98	98
2^3	200	198	198	198	198	198
2^4	400	398	398	398	398	398
2^5	800	798	798	798	798	798
2^6	1600	1599	1599	1599	1599	1599
2^7	3200	3197	3197	3197	3197	3197
$2^0+\cdots+2^7$	6375	6377	6377	6377	6377	6377

TABLE 4-5

Flight Unit No. 2, Serial No. F004
Analog/Digital Conversion at 0°C

Bit	Voltage Step (mv)	Channel 1 (mv)	Channel 2 (mv)	Channel 3 (mv)	Channel 4 (mv)	Channel 5 (mv)
2^0	25	22	24	24	24	24
2^1	50	46	48	48	48	48
2^2	100	95	97	98	98	98
2^3	200	195	197	197	198	198
2^4	400	397	397	397	397	397
2^5	800	798	798	798	798	797
2^6	1600	1600	1600	1600	1600	1600
2^7	3200	3195	3196	3195	3195	3195
$2^0+\cdots 2^7$	6375	6372	6372	6372	6372	6372

TABLE 4-6

Flight Unit No. 2, Serial No. F004
Analog/Digital Conversion at +60°C

Bit	Voltage Step (mv)	Channel 1 (mv)	Channel 2 (mv)	Channel 3 (mv)	Channel 4 (mv)	Channel 5 (mv)
2^0	25	23	24	24	24	24
2^1	50	47	48	48	48	48
2^2	100	96	98	98	98	98
2^3	200	196	198	198	198	198
2^4	400	398	398	398	398	398
2^5	800	800	799	799	799	799
2^6	1600	1602	1602	1601	1602	1602
$2^0+\cdots 2^7$	6375	6381	6382	6381	6381	6381

SECTION 5

NEW TECHNOLOGY

No new technology is applicable to the fabrication and testing of the MRIR units under Contract NAS5-10215.

SECTION 6

BIBLIOGRAPHY

The following documents are directly applicable to the fabrication of the Prototype and Flight model MRIR-T/ME units under Contract NAS5-10215.

6.1 TECHNICAL REPORTS

- DO401-024 -30 December 1966
  Environmental Test Report, MRIR Prototype Unit, NIMBUS B
- DO401-026 -30 January 1967
  Environmental Test Report, MRIR Flight No. 1 and Flight No. 2, NIMBUS B.

6.2 MONTHLY PROGRESS REPORTS

- DO515-001 - 5 August 1966
  Monthly Progress Report No. 1
  Medium Resolution Infrared Radiometer (MRIR) Telemetry Units
- DO515-002 - 7 September 1966
  Monthly Progress Report No. 2
  Medium Resolution Infrared Radiometer (MRIR) Telemetry Units

- DO515-003 - 18 October 1966
  Monthly Progress Report No. 3
  Medium Resolution Infrared Radiometer (MRIR)
  Telemetry Units
- DO515-004 - 14 November 1966
  Monthly Progress Report No. 4
  Medium Resolution Infrared Radiometer (MRIR)
  Telemetry Units
- DO515-005 - 14 December 1966
  Monthly Progress Report No. 5
  Medium Resolution Infrared Radiometer (MRIR)
  Telemetry Units
- DO515-006 - 10 January 1967
  Monthly Progress Report No. 6
  Medium Resolution Infrared Radiometer (MRIR)
  Telemetry Units
- DO515-007 - 6 February 1967
  Monthly Progress Report No. 7
  Medium Resolution Infrared Radiometer (MRIR)
  Telemetry Units
- DO515-008 - 13 March 1967
  Monthly Progress Report No. 8
  Medium Resolution Infrared Radiometer (MRIR)
  Telemetry Units

6.3 TELEPHONE DOCUMENTATIONS

1966

- Job 48100-1, dated 26 July 1966
- Job 48100-2, dated 8 September 1966
- Job 48100-3, dated 21 September 1966
- Job 48100-4, dated 28 September 1966
- Job 48100-5, dated 10 October 1966
- Job 48100-6, dated 18 October 1966
- Job 48100-7, dated 24 October 1966
- Job 48100-8, dated 3 November 1966
- Job 48100-9, dated 4 November 1966
- Job 48100-10, dated 5 December 1966
- Job 48100-11, dated 7 December 1966

1967

- Job 48100-12, dated 1 February 1967
- Job 48100-13, dated 21 February 1967

6.4 FUNCTIONAL TEST SPECIFICATIONS

- AO201-019 - 10 March 1966
  Functional Test Specification for the MRIR-PCM Digital Subsystem, NIMBUS B
- AO205-109 - 23 January 1967
  Functional Test Specification for Analog Input and 24-kHz Generator, Part No. 10424-502
- AO205-110 - 5 October 1966
  Functional Test Specification for Analog-to-Digital Converter, Part No. 10426-502

- A0205-111 - 24 January 1967
  Functional Test Specification for Analog-to-Digital Data Control, Part No. 10428-502
- A0205-112 - 10 October 1966
  Functional Test Specification for Encode Timing Generator, Part No. 10430-502
- A0205-113 - 24 January 1967
  Functional Test Specification for Frame Sync and Data Output, Part No. 10432-502
- A0205-114 - 4 October 1966
  Functional Test Specification for DC/DC Converter No. 1 and No. 2, Part Nos. 10434-502 and 10436-502.

APPENDIX A

PROTOTYPE AND FLIGHT MRIR-T/ME UNITS

ELECTRICAL SCHEMATICS

AND

PRINTED CIRCUIT BOARD ASSEMBLY DRAWINGS

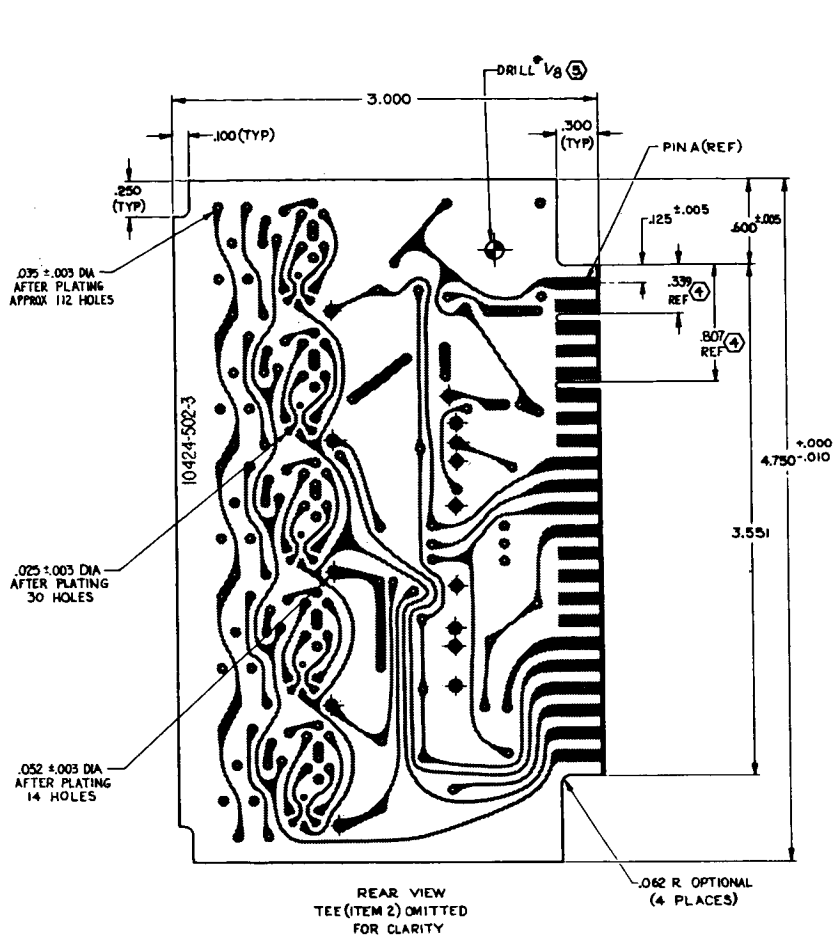
APPENDIX A

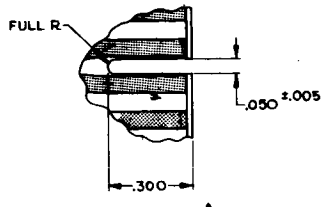
PROTOTYPE AND FLIGHT MRIR-T/ME UNITS ELECTRICAL SCHEMATICS AND PRINTED CIRCUIT BOARD ASSEMBLY DRAWINGS

The following section contains the electrical schematics and printed circuit board assembly drawings.

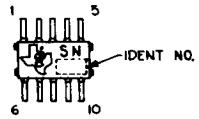
A.1 LIST OF DRAWINGS

10424-502	Analog Inputs and 25-kHz Generator
10425-502	Schematic, Analog Inputs and 25-kHz Generator
10426-502	Analog-to-Digital Converter
10427-502	Schematic, Analog-to-Digital Converter
10428-502	Schematic, Analog-to-Digital Data Converter
10429-502	Schematic, Analog-to-Digital Data Control
10430-502	Encode Timing Generator
10431-502	Schematic, Encode Timing Generator
10432-502	Frame Sync and Data Output
10433-502	Schematic, Frame Sync and Data Output
10434-502	DC/DC Converter No. 1
10435-502	Schematic, DC/DC Converter No. 1
10436-502	DC/DC Converter No. 2
10437-502	Schematic, DC/DC Converter No. 2





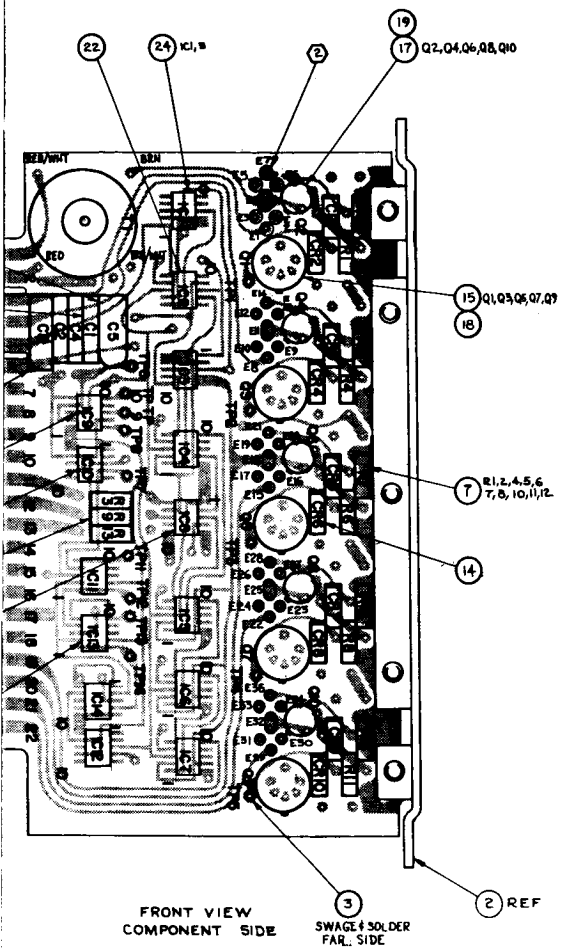
DETAIL A
(2 PLACES)
SCALE: 4/1



PIN ORIENTATION OF MODULES
SCALE: 4/1

FOLDOUT FRAME

REVISIONS			
SYM	ZONE	DESCRIPTION	DATE & APPROVAL
		A MAY BE REPORDERED B CANNOT BE REPORDERED C NONE	CANCEL
A		1. IN L/M TRANSISTOR 1005/2N3609 WAS 1005 2. IN L/M SOLID STATE MODULES SN517/SN867 WAS SN517; SN515/SN865 WAS SN515 SN514/SN864 WAS SN514 SN512/SN862 WAS SN512 SN511/SN861 WAS SN511 SN510/SN860 WAS SN510 EFFECT ON: ITEM 1 RECORD ITEM 2 ALL PARTS	EO 1774 EO 1767 2/3/67 Q.F.



FRONT VIEW COMPONENT SIDE

SWAGE & SOLDER FAR. SIDE

WIRE LIST				
TRANSISTOR NUMBER	PROCEDURE I (2)		PROCEDURE II (1)	
	FROM	TO	FROM	TO
Q1	E1	E2	E1	E3
	E3	E4		
	E4	E5	E5	E7
	E6	E7		
Q3	E8	E9	E8	E10
	E10	E11		
	E11	E12	E12	E14
	E13	E14		
Q5	E15	E16	E15	E17
	E17	E18		
	E18	E19	E19	E21
	E20	E21		
Q7	E22	E23	E22	E24
	E24	E25		
	E25	E26	E26	E28
	E27	E28		
Q9	E29	E30	E29	E31
	E31	E32		
	E32	E33	E33	E35
	E34	E35		

ITEM NO.	REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SIZE, DESCRIPTION & SPECIFICATION			ZONE
35	5	MS20470A2-4	RIVET				
34	1	MS35233-13	SCREW				
33	1	MS35333-70	WASHER LK				
32	1	AN960C4L	WASHER FLAT				
(14) 30			WIRE	#30	ENAMEL COATED	COML	
(13) 29	1	100-1	RETAINER TOROID			COML	
(11) 26	2	SN517/SN867	SOLID STATE MODULE	WITH MYLAR INSULATOR		COML	
25	1	SN515/SN865					
24	2	SN514/SN864					
23	1	SN512/SN862					
22	1	SN511/SN861					
(11) 21	7	SN510/SN860	SOLID STATE MODULE	WITH MYLAR INSULATOR		COML	
(12) 19	5	RMA2001	TRANSISTOR MOUNT	TO-18		COML	
(15) 18	5	10193	TRANSISTOR MOUNT	TO-5	8 LEADS		
(11) 17	5	2N2604	TRANSISTOR				
(10) 16	5	1005/2N3609	TRANSISTOR			COML	
(9) 14	10	1N4153	DIODE			COML	
12	2		CAPACITOR	(6)		COML	
(7) 11	1	CYFM15C471G		470pf ±2% 500V			
(7) 10	1	CYFM10C101G		100pf ±2% 500V			
(8) 9	1	KG22J15KMS	CAPACITOR	22μf ±10% 15V		COML	
(7) 7	10	RL07S	RESISTOR	100K ±2% 1/4W		COML	
(7) 6	8	RL07S	RESISTOR	4.7K ±2% 1/4W		COML	
4	1	10003-403	TRANSFORMER				
3	14	910443-203	TERMINAL			DSCD	
2	1	11606-203-11	TEE-PCB ASSY				
1	1	10424-502-3	PCB	.062 x 3.06 x 4.81	(3)		
ITEM NO.	REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SIZE, DESCRIPTION & SPECIFICATION			ZONE
			ANALOG INPUTS & 25 KC GEN.				

LIST OF MATERIAL OR PARTS LIST

(15) 25. MILTON ROSS METALS CO, SOUTHAMPTON, PA.
(14) 24. REA MAGNETIC WIRE CO INC; FORT WAYNE, IND
(13) 23. MODULAR ELECTRONICS; INGLEWOOD, CALIF
(12) 22. RAYBESTOS-MANHATTAN; LOS ANGELES, CALIF.
(11) 21. TEXAS INSTRUMENTS INC; DALLAS, TEXAS
(10) 20. GENERAL MICRO-ELECTRONICS INC; SANTA CLARA, CALIF
(9) 19. GENERAL ELECTRIC CO, SEMI-COND DIV; SYRACUSE N.Y.
(8) 18. KEMET DEPT UNION CARBIDE CORP; CLEVELAND, OHIO.
(7) 17. CORNING GLASS WORKS; BRADFORD, PA.
(6) 16. VALUE TO BE DETERMINED AT FUNCTIONAL TEST.
(5) 15. DO NOT PLATE THRU
14. COAT PCB ASSY PER CCP SPEC A0108-004
13. REF SCHEMATIC DWG NO. 10425-502
12. COMPONENT REF DESIGNATIONS ARE FOR LOCATING PURPOSES ONLY AND DO NOT APPEAR ON ACTUAL PART.
(4) 11. KEYSLOT DIMENSIONS ARE FOR REFERENCE ONLY, SLOT SHOULD BE CENTERED BETWEEN PINS AND MUST NOT TOUCH CIRCUITRY.
10. MATCH DRILL AND RIVET ITEMS 1 AND 2 USING JIG FIXTURE 11430-203
9. FABRICATE PER CCP SPEC A0105-008
8. SILK SCREEN USING SSM 10424-502-3
7. FABRICATE USING PCM 10424-502-3
(3) 6. EPOXY GLASS LAMINATE WITH 2 OZ COPPER BOTH SIDES, MIL-P-13949C, TYPE GE
5. PLATING TO BE PER CCP SPEC A0105-008
4. CHAMFER CONNECTOR TIP .020 x 30° BOTH SIDES.
3. BOARD THICKNESS AT CONNECTOR TIP NOT TO EXCEED .065 +.003 -.008
(2) 2. INSTALL ITEM 30 AT PLACES INDICATED AS SHOWN, PER PROCEDURE II OF WIRE LIST
(1) 1. IF TRANSISTOR INDICATED IN WIRE LIST FAILS DELETE WIRING OF PROCEDURE I AND ADD WIRES PER PROCEDURE II
NOTE: UNLESS OTHERWISE SPECIFIED

UNLESS OTHERWISE SPECIFIED	DRAWN	D. HAMPTON	DATE 10-7-66
DIMENSIONS ARE IN INCHES	CHECK		10-7-66
TOLERANCES ON DECIMALS .XX ±.03 .XXX ±.010 ANGLES ±0° 30'	APPD		10-3-66
DRILLED HOLES .040 TO .125 +.002 -.001; .126 TO .228 +.003 -.001; .234 TO .500 +.004 -.001; .515 TO .750 +.005 -.001; .765 TO 1.000 +.007 -.001; 1.015 TO 2.000 +.008 -.001	APPD		
FINISH			
HEAT TREAT			
SURFACE ROUGHNESS PER MIL-STD-10 ✓			

CALIFORNIA COMPUTER PRODUCTS INC.
305 MULLER, ANAHEIM, CALIFORNIA

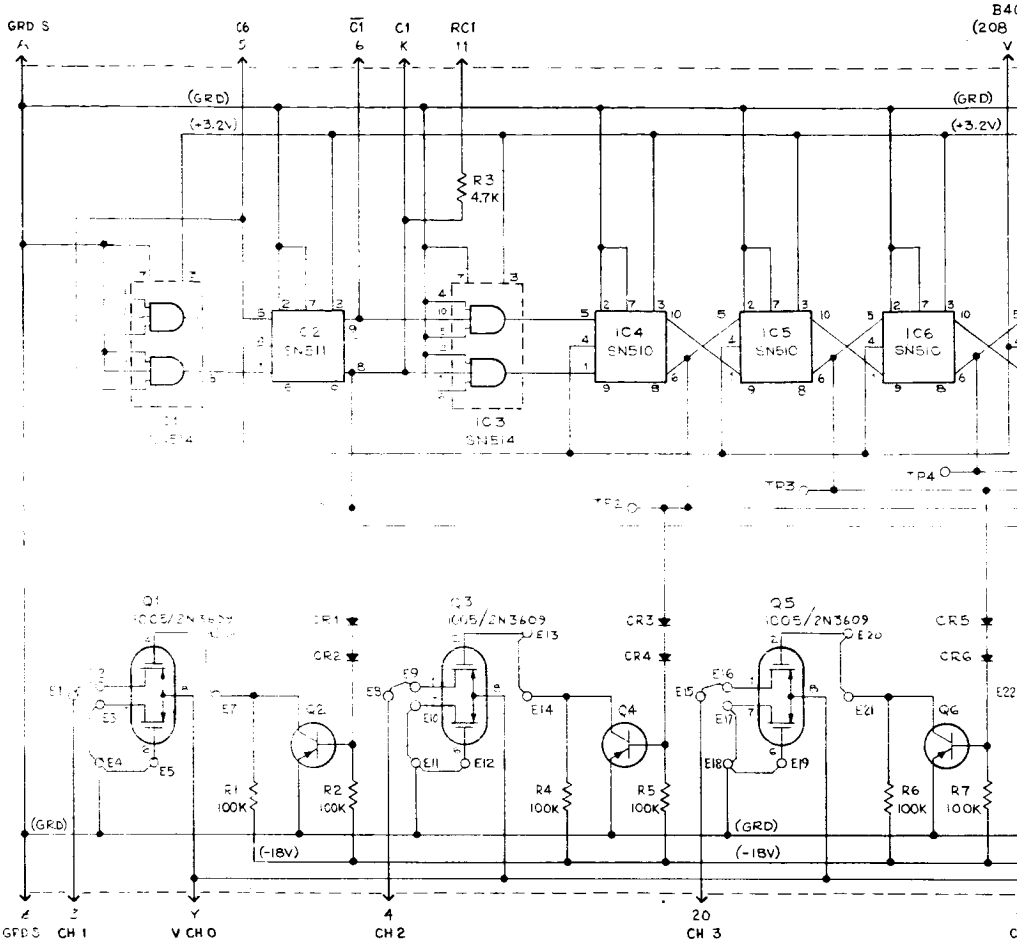
ANALOG INPUTS & 25KC GENERATOR

SCALE: 2/1 | SIZE: F | 10424-502

DO NOT SCALE THIS DRAWING | WEIGHT | SHEET

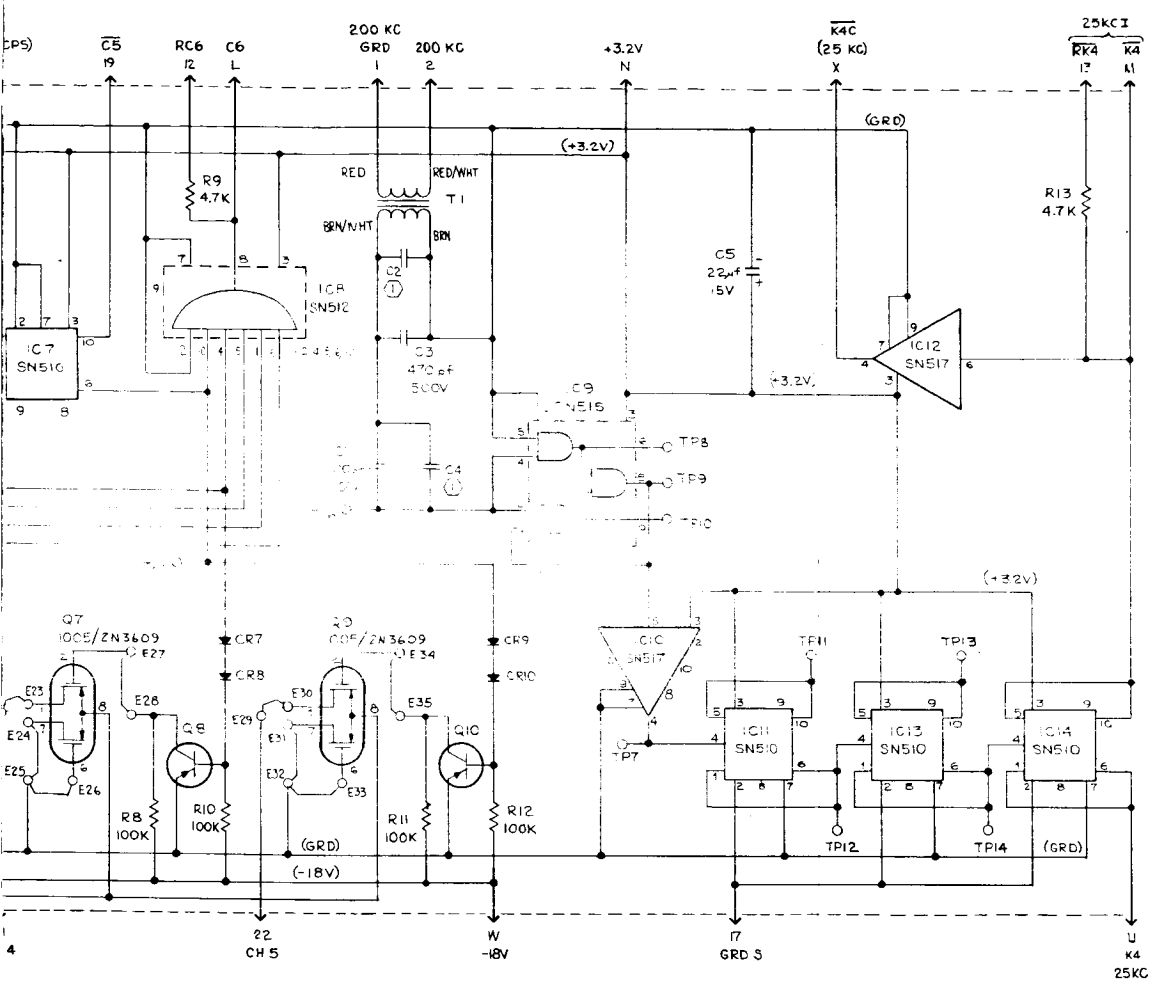
10424-502 A

FOLDOUT FRAME 2



FOLDOUT FRAME 1

REVISIONS			
SYM	ZONE	DESCRIPTION	DATE
		[1] MAY BE REWORKED [2] CANNOT BE REWORKED [3] NONE	
A		1. PIN 5 WAS F - PIN 6 WAS F 2. ADDED TRANSISTOR NO 2N3609 TO Q1, 3, 5, 7 AND 9 EFFECT ON: NONE	



① 5 VALUE TO BE DETERMINED AT FUNCTIONAL TEST
4. REF ASSY DWG NO 10424-502
3. ALL RESISTOR VALUES IN OHMS ±2% ½W
2. ALL DIODES ARE IN4153
1. ALL TRANSISTORS ARE 2N2604
NOTE: UNLESS OTHERWISE SPECIFIED

REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SIZE, DESCRIPTION & SPECIFICATION
1	10425-502	SCHEMATIC	

LIST OF MATERIAL OR PARTS LIST

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS: XX ± .03, XXX ± .010
ANGLES ± 0° 30'
DRILLED HOLES
.040 TO .1285 +.002 −.001
.136 TO .228 +.003 −.001
.234 TO .500 +.004 −.001
.515 TO .750 +.005 −.001
.765 TO 1.000 +.007 −.001
1.015 TO 2.000 +.010 −.001

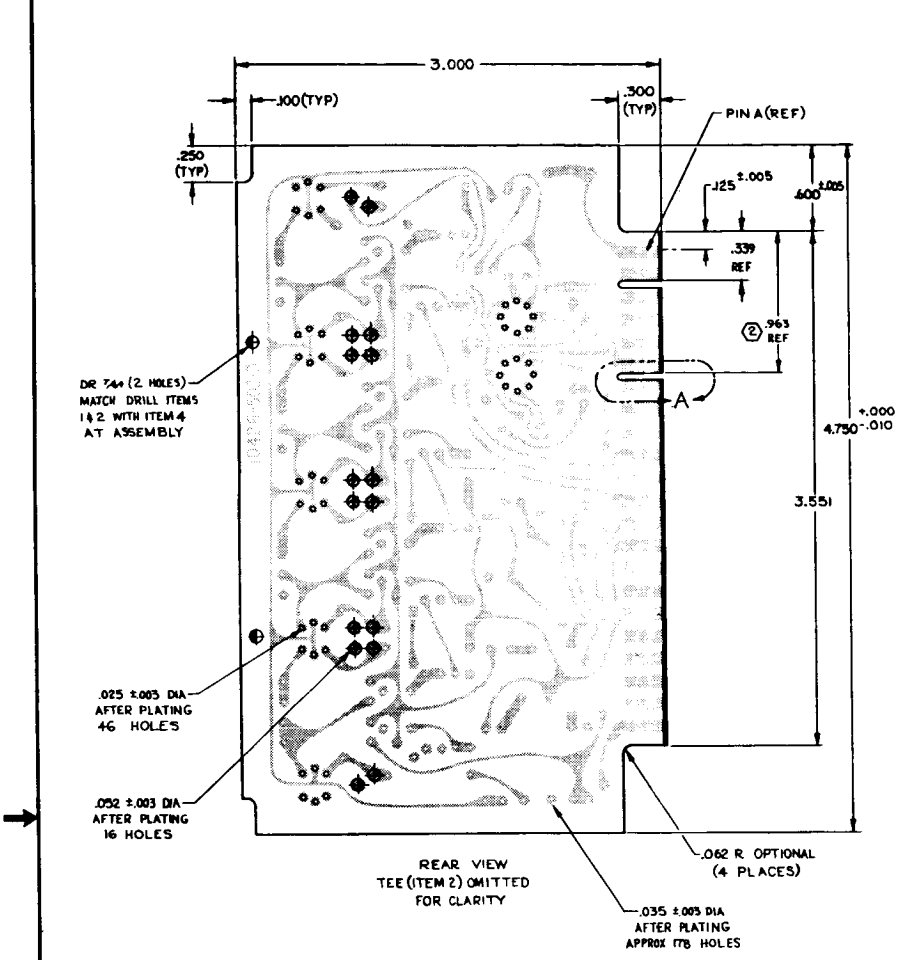
DRAWN	O. HAMPTON	22 Jan '64
CHECK		
APPD		10 7 64
APPD		
FINISH		
HEAT TREAT		
SURFACE ROUGHNESS PER MIL-STD-10	✓	

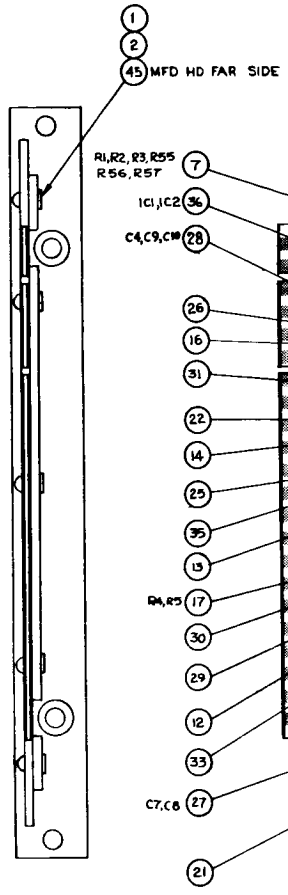
CALIFORNIA COMPUTER PRODUCTS INC.
305 MULLER AVE, CALIFORNIA

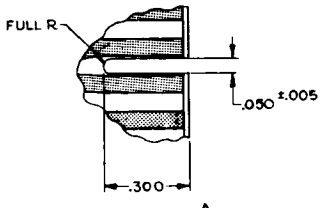
SCHEMATIC
ANALOG INPUTS &
25 KC GENERATOR

SCALE: NONE
SIZE: F
10425-502
DO NOT SCALE THIS DRAWING
WEIGHT

FOLDOUT FRAME 2







DETAIL A
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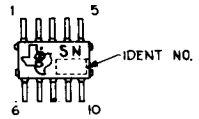
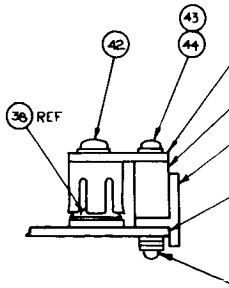
SCALE: 4/1



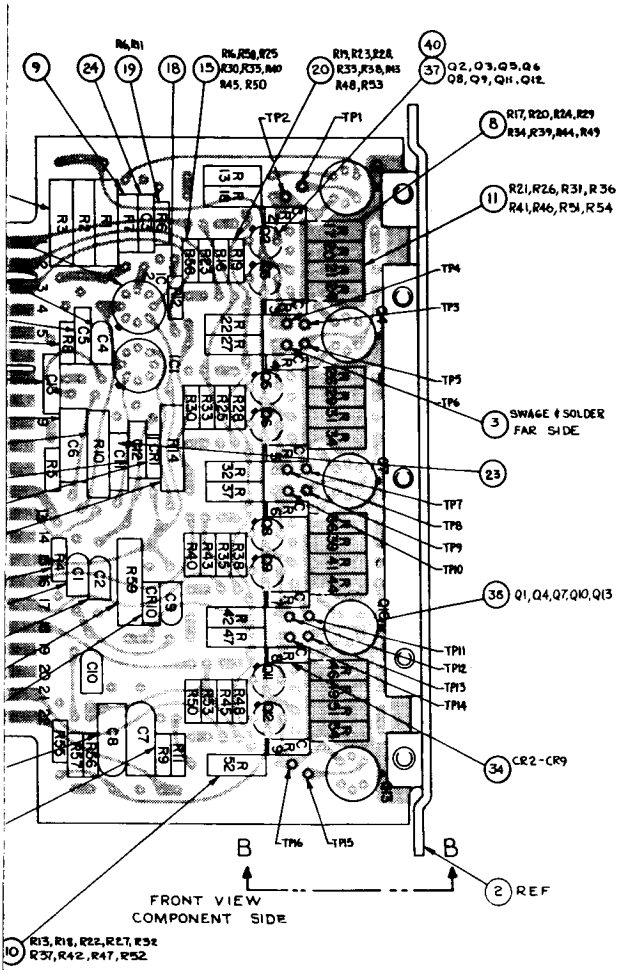
PIN ORIENTATION
OF MODULES
SCALE: 4/1



VIEW B-B

FOLDOUT FRAME 1

REVISIONS				
SYM	ZONE	DESCRIPTION		DATE & APPROVAL
		A MAY BE REMOVED B CANNOT BE REMOVED C NONE		
A		1. ADDED ITEM 41, 5610-10-31 WASHER NYLON 2 REQ AND GEN. NOTE 28. 2. ADDED ITEM 32, AN960 C 2L WASHER FLAT 2 REQ. 3. ITEM 43, 2 REQ WAS 4 REQ. 4. ITEM 14 WAS 6K ±1% 7/8 W 5. ITEM 12 WAS 4.7K ±1% 7/8 W EFFECT ON: ALL PARTS		EO 1800 1-17-67 D.F.



ITEM NO.	REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SIZE, DESCRIPTION & SPECIFICATION			ZONE
45	5	MS20470A2-4	RIVET				
44	4	MS35233-3	SCREW				
43	2	MS35333-69	WASHER-LOCK				
12	42	5	30022	RETAINER-TRANSISTOR	TO-5		COML
18	41	2	5610-10-31	WASHER NYLON			COML
15	40	8	RMA 2001	MOUNT-TRANSISTOR	TO-18		COML
17	39	7	10193	MOUNT-TXTOR	TO-5 (8 LEADS)		COML
16	38	5	2N3680	TRANSISTOR			COML
11	37	8	2N995	TRANSISTOR			
11	36	2	μA709	OPR AMPLIFIER			
10	35	1	IN4574	DIODE			
9	34	8	IN4153	DIODE			
10	33	1	IN748A	DIODE			COML
	32	2	AN 960 C 2L	WASHER FLAT			
	31	1		CAPACITOR	(9)		
8	30	1	KG6R8J6KMS	CAPACITOR	6.8μf ±10% 6V		COML
8	29	1	KG2R2J20KMS		2.2μf ±10% 20V		
	28	3	KG3R3J15KMS		3.3μf ±10% 15V		
8	27	2	KG6R8J35KMS		6.8μf ±10% 35V		
6	26	1	CYFM15C681G		680pf ±2% 300V		
	25	1	CYFM10C151G		150pf ±2% 500V		
	24	1	CYFM10C680G		68 pf ±2% 500V		
6	23	1	CYFM10C100G		10pf ±2% 500V		
6	22	1	CYFM15C102G	CAPACITOR	1000pf ±2% 300V		
M	21	1	CB47G5	RESISTOR	4.7Ω ±5% 1/4W		
6	20	8	RL07S		27K ±2% 1/4W		
	19	2			10K		
	18	1			4.7K		
	17	2			3.3K		
	16	1			1.5K		
6	15	8	RL07S		1.2K ±2% 1/4W		
5	14	1	MEA-TO		6.04K ±1% 1/8W		
5	13	1	MEA-TO		5.62K ±1% 1/8W		
5	12	1	MEA-TO		4.75K ±1% 1/8W		
4	11	8	1318P		20K ±.05% .1W		
	10	9			15K		
	9	1			12K		
4	8	8	1318P		10K ±.05% .1W		
	7	6		RESISTOR	(3)		COML
	5	2	11519-203	SPACER			
	4	1	11438-203	HEAT SINK-TRANSISTOR			
	3	16	910443-203	TERMINAL			DSCD
	2	1	116006-203-51	TEE-PCB ASSY			
	1	1	10426-502-3	PCB	.062 x 3.06 x 4.81	(1)	
ITEM	1	10426-502	A/D CONV				

LIST OF MATERIAL OR PARTS LIST

(18) 28. SEASTROM MFG. CO. GLENDALE CALIF
(17) 27. MILTON ROSS METALS CO., SOUTHAMPTON, PA.
26. COAT PCB ASSY PER CCP SPEC A0108-004
(16) 25. TEXAS INSTRUMENTS INC, DALLAS, TEXAS
(15) 24. RAYBESTOS-MANHATTAN; LOS ANGELES, CALIF.
(M) 23. ALLEN BRADLEY CO, MILWAUKEE, WISCONSIN
(13) 22. DO NOT PLATE THRU
(12) 21. NATIONAL BERYLLIA CORP; HASKELL, N.J.
(11) 20. FAIRCHILD SEMICOND DIV; MOUNTAIN VIEW, CALIF
(10) 19. MOTOROLA SEMICOND PROD; PHOENIX, ARIZ
(9) 18. GENERAL ELECTRIC SEMICOND DIV. SYRACUSE, N.Y.
(8) 17. KEMET DEPT UNION CARBIDE CORP CLEVELAND, OHIO
(7) 16. GENERAL ELECTRIC CO., SCHENECTADY, N.Y.
(6) 15. CORNING GLASS WORKS; BRADFORD, PA.
(5) 14. I.R.C.; PHILADELPHIA, PA.
(4) 13. KELVIN VAN NUYS, CALIF
(3) 12. VALUE TO BE DETERMINED AT FUNCTIONAL TEST
11. REF SCHEMATIC DWG NO. 10427-502
10. COMPONENT REF DESIGNATIONS ARE FOR LOCATING PURPOSES ONLY AND DO NOT APPEAR ON ACTUAL PART.
(2) 9. KEYSLOT DIMENSIONS ARE FOR REFERENCE ONLY, SLOT SHOULD BE CENTERED BETWEEN PINS AND MUST NOT TOUCH CIRCUITRY.
8. MATCH DRILL AND RIVET ITEMS 1 AND 2 USING JIG FIXTURE 11430-203
7. FABRICATE PER CCP SPEC A0105-008
6. SILK SCREEN USING SSM 10426-502-3
5. FABRICATE USING PCM 10426-502-3
(1) 4. EPOXY GLASS LAMINATE WITH 2 OZ COPPER BOTH SIDES, MIL-P-13949C, TYPE GE
3. PLATING TO BE PER CCP SPEC A0105-008
2. CHAMFER CONNECTOR TIP .020 x 30° BOTH SIDES
1. BOARD THICKNESS AT CONNECTOR TIP NOT TO EXCEED .065 +.005 -.005
NOTE: UNLESS OTHERWISE SPECIFIED

UNLESS OTHERWISE SPECIFIED			
DIMENSIONS ARE IN INCHES	DRAWN	G. HAMPTON	7-27-66
TOLERANCES ON	CHECK		8-4-66
DECIMALS .XX ± .03 .XXX ± .010 ANGLES ± 0° 30'	APPD		
	APPD		
DRILLED HOLES .040 TO .1285 +.002 −.001; .136 TO .228 +.003 −.001; .234 TO .500 +.004 −.001; .515 TO .750 +.005 −.001; .765 TO 1.000 +.007 −.001; 1.015 TO 2.000 +.010 −.001	FINISH		
	HEAT TREAT		
	SURFACE ROUGHNESS PER MIL-STD-10	✓	

CALIFORNIA COMPUTER PRODUCTS INC.
305 MULLER, ANAHEIM, CALIFORNIA

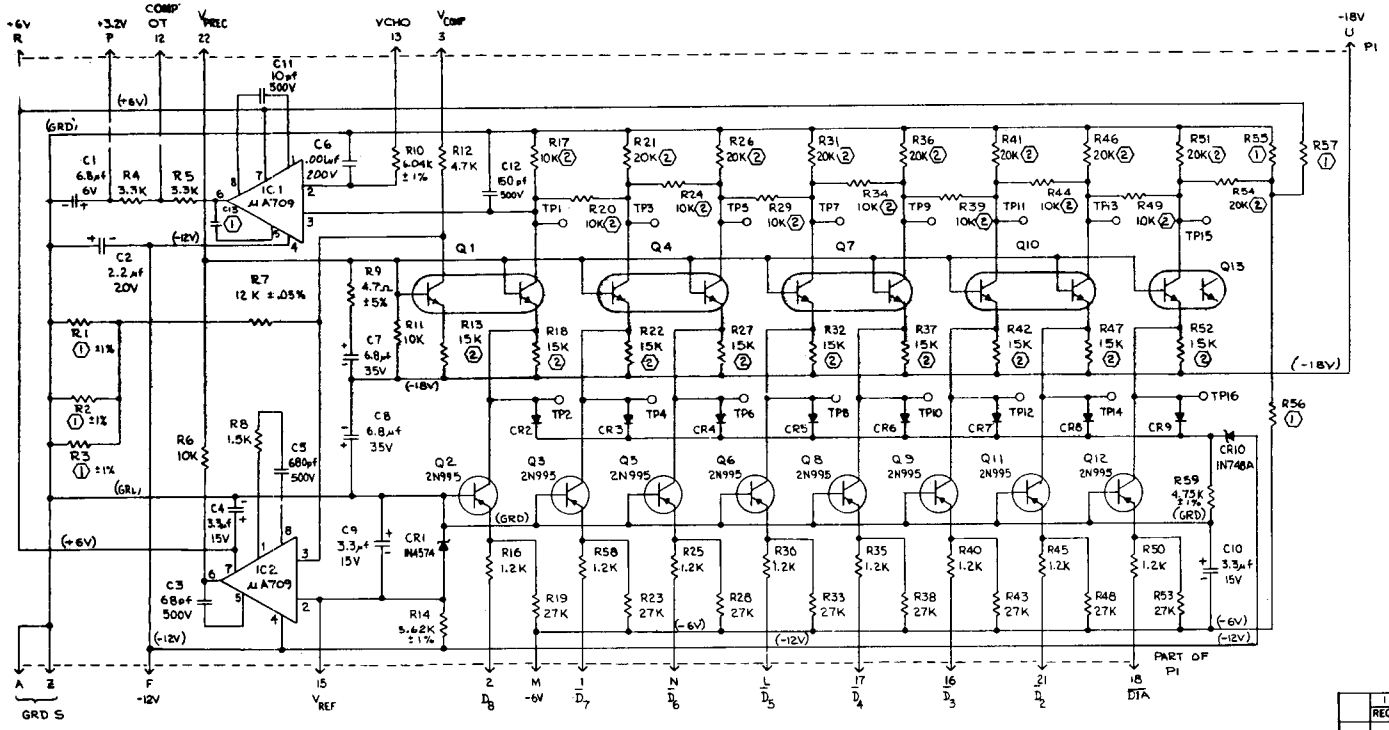
ANALOG/DIGITAL CONVERTER

SCALE: 2/1	SIZE F	10426-502
DO NOT SCALE THIS DRAWING	WEIGHT	SHEET

10426-502 A

FOLDOUT FRAME 2

REVISIONS			
SYM	ZONE	DESCRIPTION	DATE & APPROVAL
A		1. R10 WAS 6K ± 1%. R59 WAS 4.7K ± 1% EFFECT ON: NONE	1-17-67 D.F.



9. CAPACITOR VALUES IN MICRO-FARADS ±10%
8. C11, C12, C13, R58 & R59 LOCATED OUT OF SEQUENCE
7. R15 OMITTED
6. REF ASSY DWG NO. 10426-502
5. TRANSISTORS ARE 2N3680
4. DIODES ARE IN4153
(2) 3. VALUES ±0.05% 0.1 W
(1) 2. VALUE TO BE DETERMINED AT FUNCTIONAL TEST
1. RESISTOR VALUES ARE IN OHMS ±2% AND ARE 1/4W
NOTE: UNLESS OTHERWISE SPECIFIED

ITEM	REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SIZE, DESCRIPTION & SPECIFICATION	ZONE
1		10427-502	SCHEMATIC		

LIST OF MATERIAL OR PARTS LIST

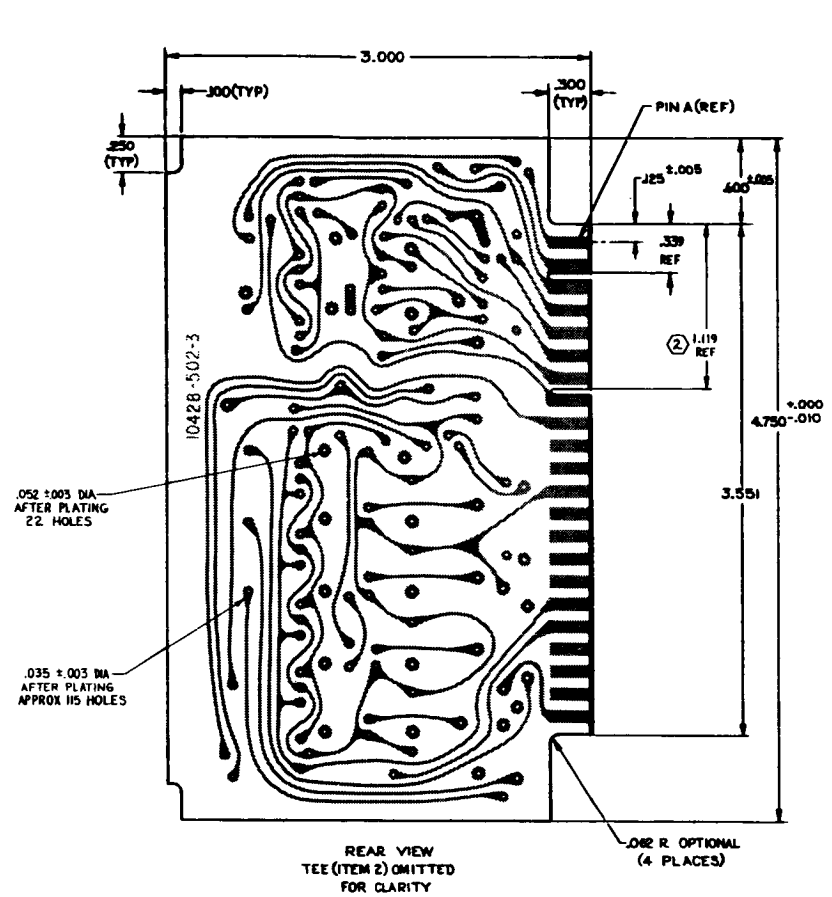
UNLESS OTHERWISE SPECIFIED	DRAWN	O. HAMPTON 5 Jan 1966
DIMENSIONS ARE IN INCHES	CHECK	5-13-66
TOLERANCES ON DECIMALS .XX ± .03 .XXX ± .010 ANGLES ± 0° 30'	APPD	5-13-66
DRILLED HOLES .040 TO .125 +.002, −.001 .136 TO .228 +.003, −.001 .234 TO .360 +.004, −.001 .515 TO .750 +.005, −.001 .765 TO 1.000 +.007, −.001 1.015 TO 2.000 +.010, −.001	APPD	5-20-66
FINISH		
HEAT TREAT		
SURFACE ROUGHNESS PER MIL-STD-10	✓	
DO NOT SCALE THIS DRAWING		

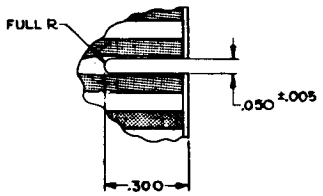
CALIFORNIA COMPUTER PRODUCTS INC.
305 MULLER, ANAHEIM, CALIFORNIA

SCHEMATIC - ANALOG/DIGITAL CONVERTER

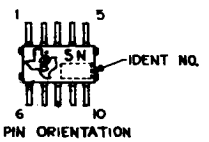
SCALE: NONE | SIZE: D | 10427-502 | WEIGHT | SHEET

10427-502 A





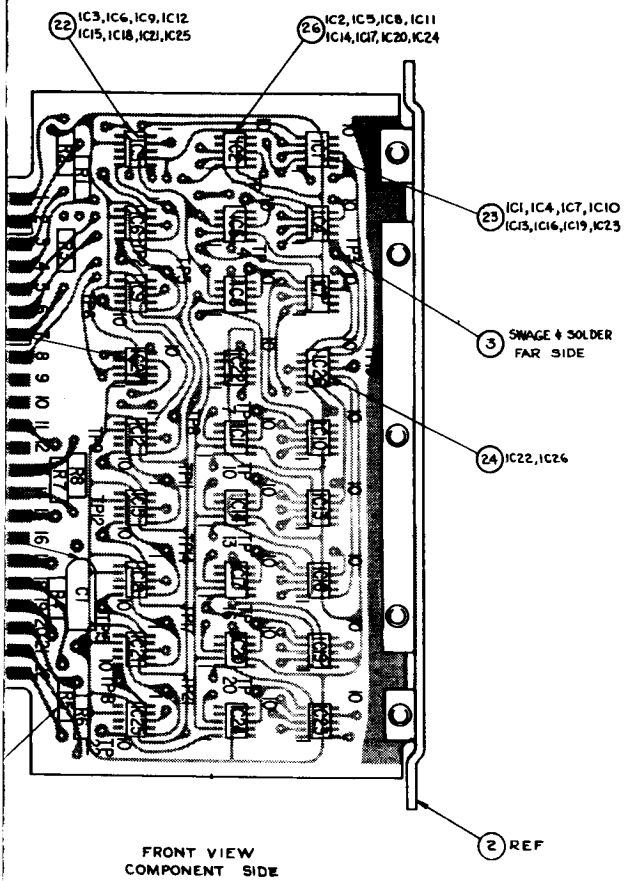
DETAIL A
(2 PLACES)
SCALE: 4/1



PIN ORIENTATION OF MODULES
SCALE: 4/1

FOLDOUT FRAME 1

REVISIONS			
LTR	ZONE	DESCRIPTION	DATE & APPROVAL
		A MAY BE REWORKED B CANNOT BE REWORKED C NONE	



FRONT VIEW
COMPONENT SIDE

ITEM NO.	REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SIZE, DESCRIPTION & SPECIFICATION			ZONE
30	5	MS20470A2-4	RIVET				
(5) 26	8	SN515	SOLID STATE MODULE WITH MYLAR INSULATOR				COML
25	1	SN514					
24	2	SN512					
23	8	SN511					
(5) 22	8	SN510	SOLID STATE MODULE WITH MYLAR INSULATOR				COML
(4) 15	8	RLO7S	RESISTOR	4.7K ±2% 1/4 W			COML
(3) 9	1	KG22J15KMS	CAPACITOR	22 μf ±10% 15V			COML
3	22	910443-203	TERMINAL				DSCD
2	1	11606-203-41	TEE-PCB ASSY				
1	1	10428-502-3	PCB	.062 × 3.06 × 4.81	①		
ITEM NO.	REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SIZE, DESCRIPTION & SPECIFICATION			ZONE
	1	10428-502	A/D DATA CONTROL				

LIST OF MATERIAL OR PARTS LIST

15. COAT PCB ASSY PER CCP SPEC A0108-004
(5) 14. TEXAS INSTRUMENTS INC; DALLAS, TEXAS
(4) 13. CORNING GLASS WORKS; PHILADELPHIA, PA.
(3) 12. KEMET DEPT UNION CARBIDE CORP, CLEVELAND, OHIO
11. REF SCHEMATIC DWG NO. 10429-502.
10. COMPONENT REF DESIGNATIONS ARE FOR LOCATING PURPOSES ONLY AND DO NOT APPEAR ON ACTUAL PART.
(2) 9. KEYSLOT DIMENSIONS ARE FOR REFERENCE ONLY, SLOT SHOULD BE CENTERED BETWEEN PINS AND MUST NOT TOUCH CIRCUITRY.
8. MATCH DRILL AND RIVET ITEMS 1 AND 2 USING JIG FIXTURE 11430-203
7. FABRICATE PER CCP SPEC A0105-008
6. SILK SCREEN USING SSM 10428-502-3
5. FABRICATE USING PCM 10428-502-3
(1) 4. EPOXY GLASS LAMINATE WITH 2 OZ COPPER BOTH SIDES, MIL-P-13949C, TYPE GE
3. PLATING TO BE PER CCP SPEC A0106-008
2. CHAMFER CONNECTOR TIP .020 × 30° BOTH SIDES
1. BOARD THICKNESS AT CONNECTOR TIP NOT TO EXCEED .065 +.003 −.005

NOTE: UNLESS OTHERWISE SPECIFIED

UNLESS OTHERWISE SPECIFIED			
DIMENSIONS ARE IN INCHES	DRAWN	[illegible]	7-27-66
TOLERANCES ON	CHECK	[illegible]	8-8-66
DECIMALS .XX ± .03 .XXX ± .010	ANGLES ± 0° 30'	APPD	
		APPD	
DRILLED HOLES	FINISH		
.060 TO .125 +.002 −.001			
.126 TO .220 +.003 −.002			
.224 TO .500 +.004 −.003	HEAT TREAT		
.525 TO .750 +.005 −.003			
.765 TO 1.000 +.007 −.003			
1.005 TO 2.000 +.008 −.003	SURFACE ROUGHNESS PER MIL-STD-10	✓	

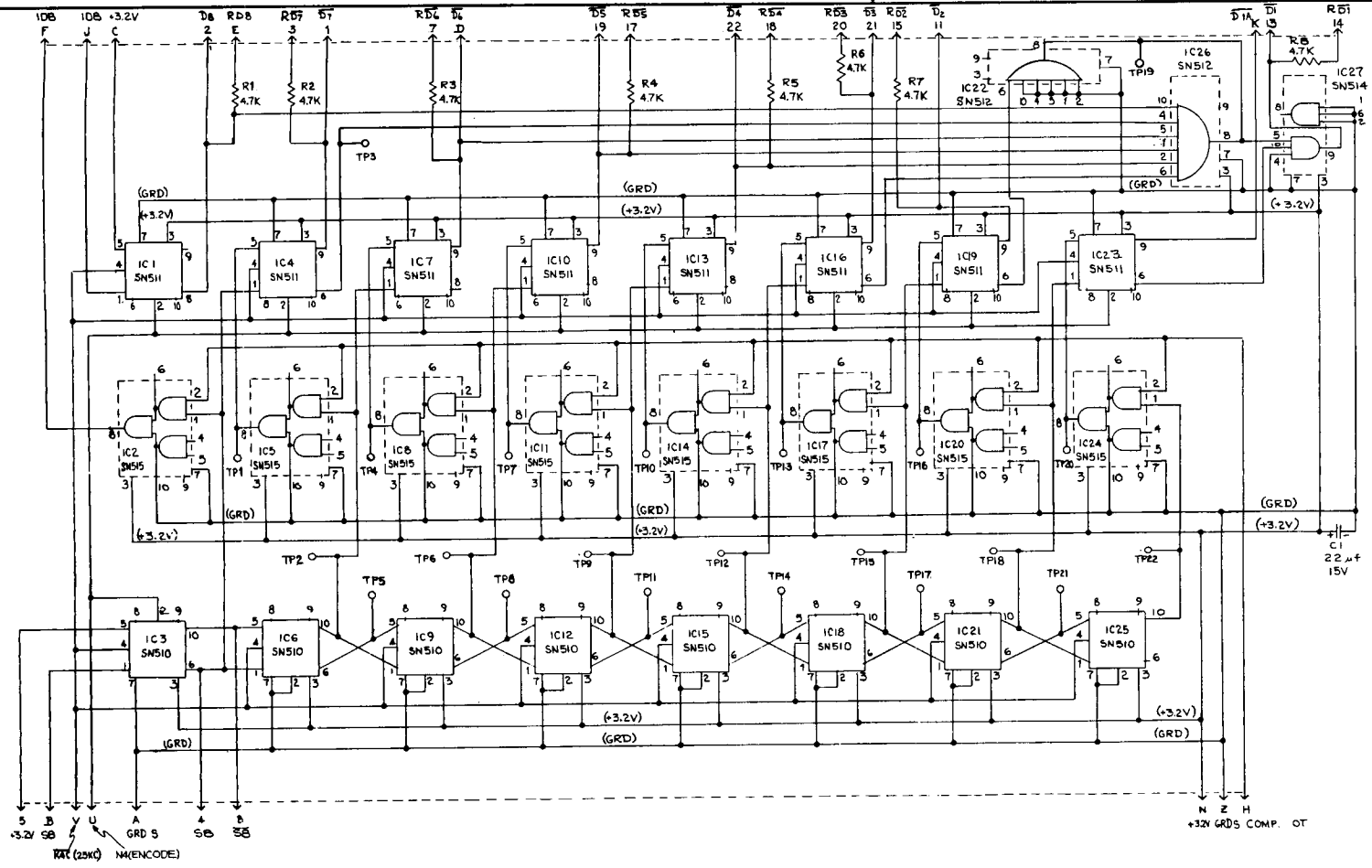
CALIFORNIA COMPUTER PRODUCTS INC.
305 MULLER, ANAHEIM, CALIFORNIA

ANALOG/DIGITAL DATA CONTROL

SCALE: 2/1	SIZE F	10428-502
DO NOT SCALE THIS DRAWING	WEIGHT	SHEET

10428-502 1

FOLDOUT FRAME 2



2. REF ASSY DWG NO. 10428-502.
1. RESISTOR VALUES ARE IN OHMS ±2% AND ARE ¼W
NOTE: UNLESS OTHERWISE SPECIFIED

REVISIONS		
SYM	ZONE	DESCRIPTION / DATE & APPROVAL
		1 MAY BE REWORKED 2 CANNOT BE REWORKED 3 NONE

REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SIZE, DESCRIPTION & SPECIFICATION	ZONE
1	10428-502	SCHEMATIC		

LIST OF MATERIAL OR PARTS LIST

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON DECIMALS: XX ± .03, XXX ± .010; ANGLES ± 0° 30'
DRILLED HOLES
.040 TO .128 +.002, —.001
.136 TO .228 +.003, —.001
.234 TO .500 +.004, —.001
.515 TO .750 +.005, —.001
.765 TO 1.000 +.007, —.001
1.015 TO 2.000 +.010, —.001

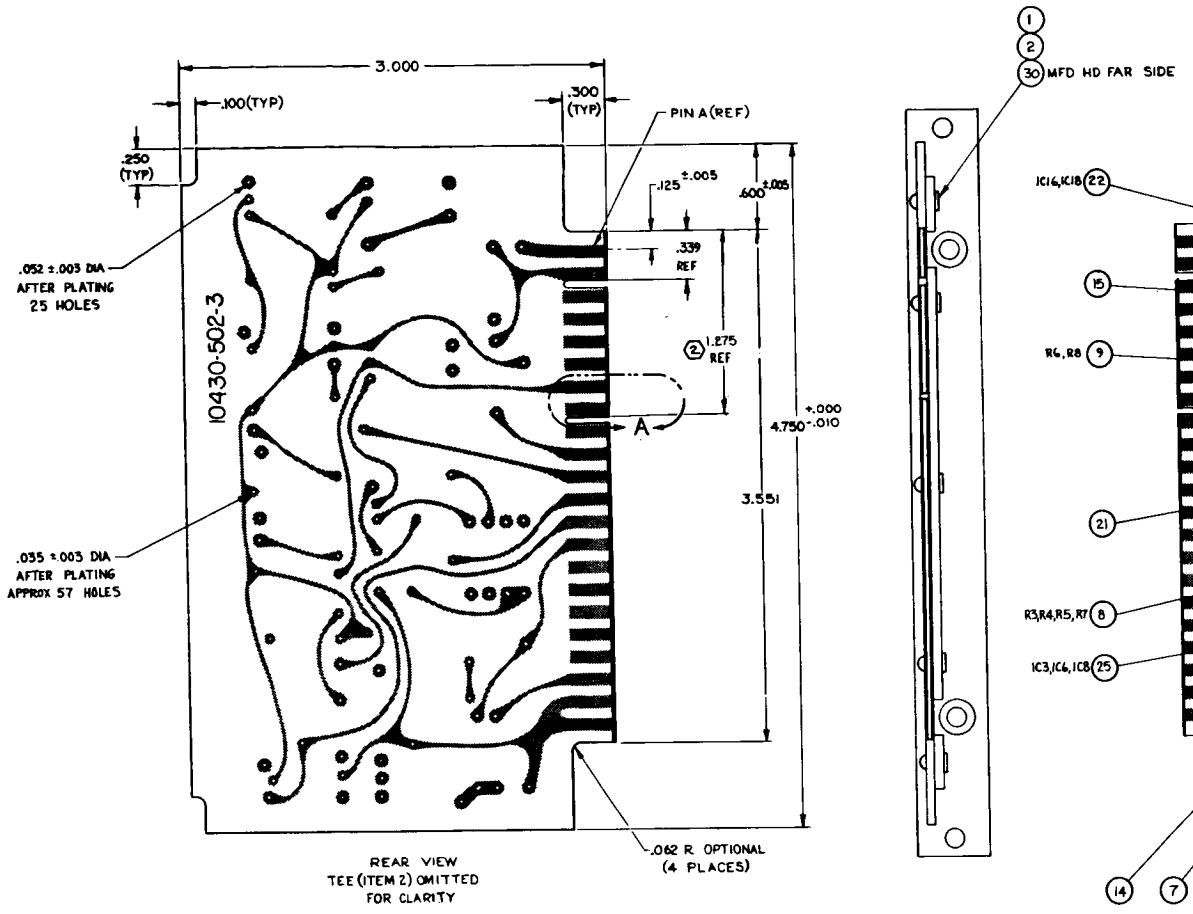
DRAWN O. HARPER 7-27-66
CHECK 8-8-66
APPD 10-2-66
APPD 10-3-66
FINISH
HEAT TREAT
SURFACE ROUGHNESS PER MIL-STD-10

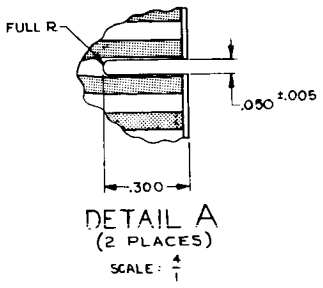
CALIFORNIA COMPUTER PRODUCTS INC.
305 MULLER, ANAHEIM, CALIFORNIA

SCHEMATIC ANALOG TO DIGITAL DATA CONTROL

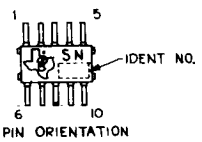
SCALE: NONE
SIZE: D
10429-502
DO NOT SCALE THIS DRAWING
WEIGHT
SHEET

10429-502





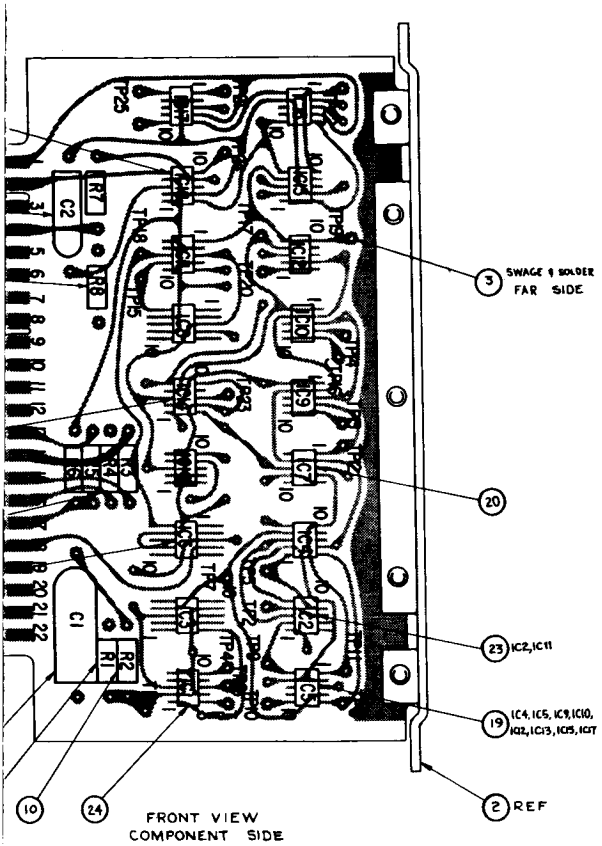
DETAIL A
(2 PLACES)
SCALE: 4/1



PIN ORIENTATION
OF MODULES
SCALE: 4/1

FOLDOUT FRAME 1

REVISIONS				
SYM	ZONE	DESCRIPTION (1 MAY BE REWORKED 2 CANNOT BE REWORKED 3 NONE)	E.C.O. NUMBER	DATE & APPROVAL
A		1. IN L/M, ADDED PART NO. "SN8.." TO IC PART NO. 2. ADDED "REV A" TO 6/IN 5 EFFECT ON: ALL PARTS	3 2	EO 1767 11-7-66



FRONT VIEW
COMPONENT SIDE

ITEM NO.	REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SIZE, DESCRIPTION & SPECIFICATION		ZONE
30	5	MS20470A2-4	RIVET			
(5) 25	3	SN517/SN867	SOLID STATE MODULE WITH MYLAR INSULATOR			COML
24	1	SN515/SN865				
23	2	SN514/SN864				
22	2	SN513/SN863				
21	1	SN512/SN862				
20	1	SN511/SN861				
(5) 19	8	SN510/SN860	SOLID STATE MODULE WITH MYLAR INSULATOR			COML
(4) 15	1	K622J15KMS	CAPACITOR	22 µf ±10% 15V		COML
(4) 14	1	K610J20KMS	CAPACITOR	10 µf ±10% 20V		COML
(3) 10	1	RL07S	RESISTOR	8.2K ±2% ¼W		COML
9	2			5.1K		
8	4			4.7K		
(3) 7	1	RL07S	RESISTOR	3.3K ±2% ¼		COML
3	2.5	910443-203	TERMINAL			DSCD
2	1	1606-203-21	TEE-PCB ASSY			
1	1	10430-502-3	PCB	.062 ± 3.06 ± 4.81	(1)	
ITEM NO.	REQD	10430-502	ENCODE TIMING GEN			

LIST OF MATERIAL OR PARTS LIST

15. COAT PCB ASSY PER CCP SPEC A0108-004
(5) 14. TEXAS INSTRUMENTS INC, DALLAS, TEXAS.
(4) 13. KEMET DEPT UNION CARBIDE INC, CLEVELAND, OHIO
(3) 12. CORNING GLASS WORKS; BRADFORD, PA.
11. REF SCHEMATIC DWG NO. 10431-502
10. COMPONENT REF DESIGNATIONS ARE FOR LOCATING PURPOSES ONLY AND DO NOT APPEAR ON ACTUAL PART.
(2) 9. KEYSLOT DIMENSIONS ARE FOR REFERENCE ONLY, SLOT SHOULD BE CENTERED BETWEEN PINS AND MUST NOT TOUCH CIRCUITRY.
8. MATCH DRILL AND RIVET ITEMS 1 AND 2 USING JIG FIXTURE 11430-203
7. FABRICATE PER CCP SPEC A0105-005
6. SILK SCREEN USING SSM 10430-502-3
5. FABRICATE USING PCM 10430-502-3, REV A
(1) 4. EPOXY GLASS LAMINATE WITH 2 OZ COPPER BOTH SIDES, MIL-P-13949C, TYPE GE
3. PLATING TO BE PER CCP SPEC A0105-002
2. CHAMFER CONNECTOR TIP .020 x 30° BOTH SIDES.
1. BOARD THICKNESS AT CONNECTOR TIP NOT TO EXCEED .065 +.003 −.005
NOTE: UNLESS OTHERWISE SPECIFIED

UNLESS OTHERWISE SPECIFIED	DRAWN	G. HAMPTON	7-27-66
DIMENSIONS ARE IN INCHES	CHECK		8-4-66
TOLERANCES ON DECIMALS XX ± .03, XXX ± .010; ANGLES ± 0° 30'	APPD		
DRILLED HOLES .040 TO .128 ± .002, — .001; .136 TO .228 ± .003, — .001; .234 TO .500 ± .004, — .001; .515 TO .750 ± .005, — .001; .765 TO 1.000 ± .007, — .001; 1.015 TO 2.000 ± .010, — .001	APPD		
FINISH			
HEAT TREAT			
SURFACE ROUGHNESS PER MIL-STD-10 ✓			

CALIFORNIA COMPUTER PRODUCTS INC.
305 MULLER, ANAHEIM, CALIFORNIA

ENCODE TIMING GENERATOR

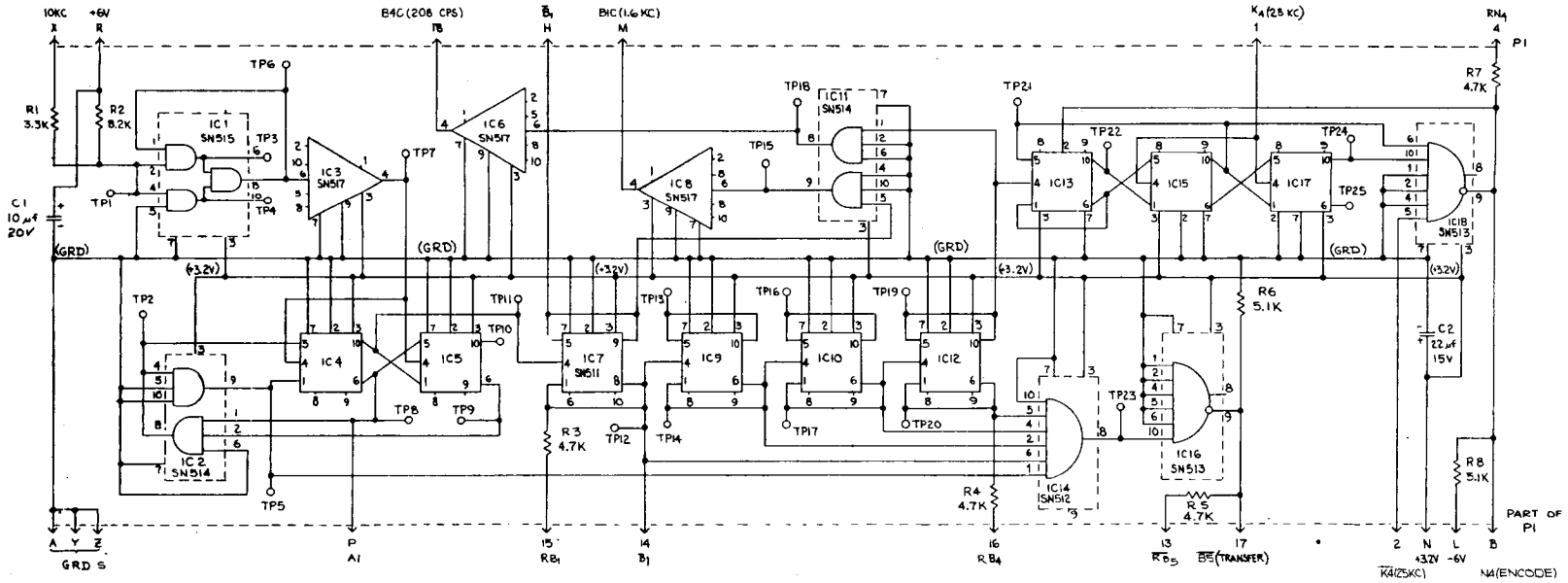
SCALE: 2/1 | SIZE F | 10430-502

DO NOT SCALE THIS DRAWING | WEIGHT | SHEET

10430-502 A

FOLDOUT FRAME 2

REVISIONS			
SYM	ZONE	DESCRIPTION	DATE & APPROVAL
		1 MAY BE REWORKED 2 CANNOT BE REWORKED 3 NONE	



3. REFERENCE ASSY DWG NO. 10430-502
2. RESISTOR VALUES ARE IN OHMS ±2% AND ARE 1/4W
1. ALL INTEGRATED CIRCUITS ARE SN510
NOTE: UNLESS OTHERWISE SPECIFIED

REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SIZE, DESCRIPTION & SPECIFICATION	ZONE
1	10431-502	SCHEM		

LIST OF MATERIAL OR PARTS LIST

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS: XX ±.03, XXX ±.010
ANGLES ±0° 30'

DRILLED HOLES

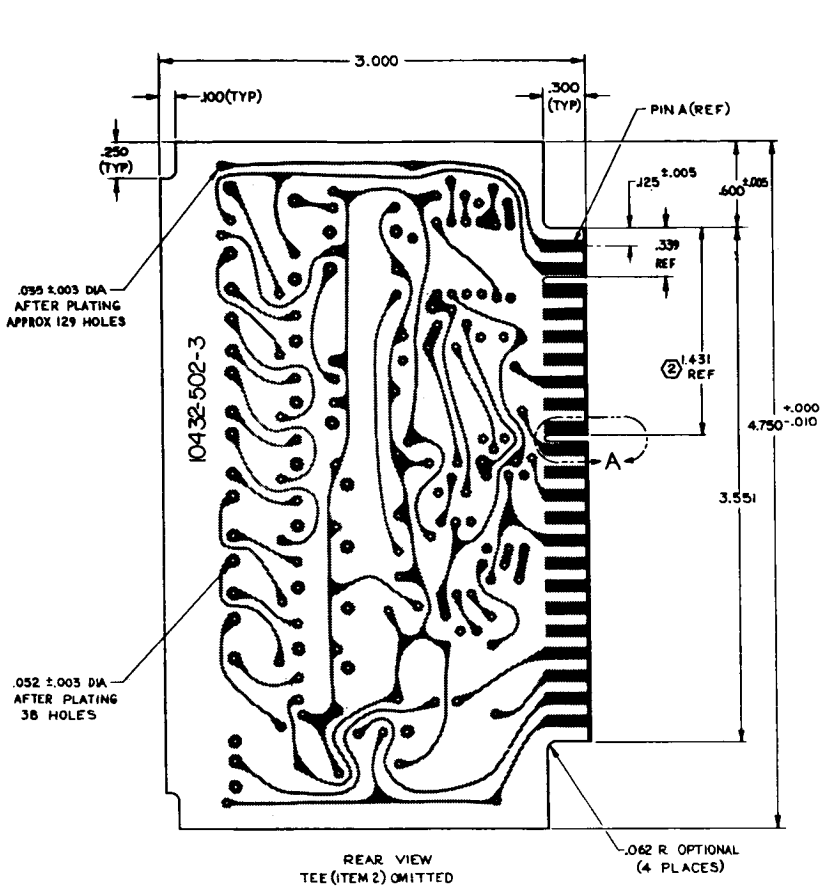
.040	TO .1285	+.002, —.001
.136	TO .228	+.003, —.001
.234	TO .500	+.004, —.001
.515	TO .750	+.005, —.001
.765	TO 1.000	+.007, —.001
1.015	TO 2.000	+.010, —.001

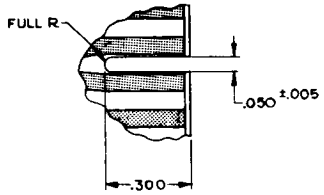
DRAWN	O. HAMPTON	12-9-65
CHECK		5-3-66
APPD		5-16-66
APPD		5-20-66
FINISH		
HEAT TREAT		
SURFACE ROUGHNESS PER MIL-STD-10		✓

CALIFORNIA COMPUTER PRODUCTS INC.
305 MULLER, ANAHEIM, CALIFORNIA

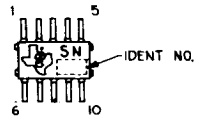
SCHEMATIC - ENCODE-TIMING GENERATOR

SCALE: NONE
SIZE: D
10431-502
DO NOT SCALE THIS DRAWING
WEIGHT
SHEET





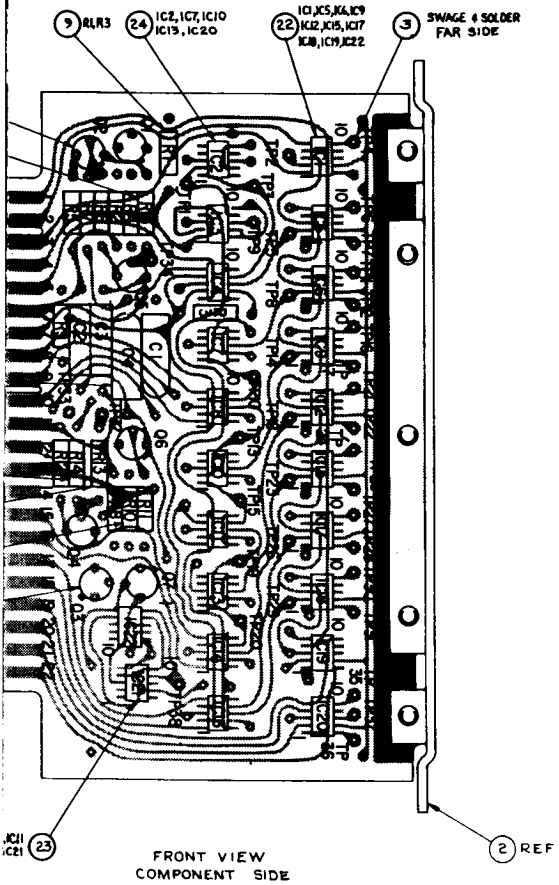
DETAIL A
(2 PLACES)
SCALE: 4/1



PIN ORIENTATION
OF MODULES
SCALE: 4/1

FOLDOUT FRAME 1

REVISIONS			
SYM	ZONE	DESCRIPTION	DATE & APPROVAL
		A MAY BE REMOVED B NONE C CANNOT BE REMOVED	



FRONT VIEW
COMPONENT SIDE

17. COAT PCB ASSY PER CCP SPEC A0108-004
(7) 16. RAYBESTOS-MANHATTAN; LOS ANGELES, CALIF.
(6) 15. FAIRCHILD SEMICOND DIV; MOUNTAINVIEW, CALIF
(5) 14. KEMET DEPT UNION CARBIDE CORP; CLEVELAND, OHIO
(4) 13. TEXAS INSTRUMENTS INC, DALLAS, TEXAS
(3) 12. CORNING GLASS WORKS; BRADFORD, PA.
11. REF SCHEMATIC DWG NO. 10433-502
10. COMPONENT REF DESIGNATIONS ARE FOR LOCATING PURPOSES ONLY, AND DO NOT APPEAR ON ACTUAL PART.
(2) 9. KEYSLOT DIMENSIONS ARE FOR REFERENCE ONLY, SLOT SHOULD BE CENTERED BETWEEN PINS AND MUST NOT TOUCH CIRCUITRY.
8. MATCH DRILL AND RIVET ITEMS 1 AND 2 USING JIG FIXTURE 11430-203
7. FABRICATE PER CCP SPEC A0105-008
6. SILK SCREEN USING SSM 10432-502-3
5. FABRICATE USING PCM 10432-502-3
(1) 4. EPOXY GLASS LAMINATE WITH 2 OZ COPPER BOTH SIDES, MIL-P-13949C, TYPE GE
3. PLATING TO BE PER CCP SPEC A0105-008
2. CHAMFER CONNECTOR TIP .020 x 30° BOTH SIDES
1. BOARD THICKNESS AT CONNECTOR TIP NOT TO EXCEED .065 $^{+.003}_{-.005}$

NOTE: UNLESS OTHERWISE SPECIFIED

ITEM NO.	REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SIZE, DESCRIPTION & SPECIFICATION			ZONE
30	5	MS20470A2-4	RIVET				
(4) 24	5	SN515	SOLID STATE MODULE WITH MYLAR INSULATOR			COML	
(4) 23	7	SN514	SOLID STATE MODULE WITH MYLAR INSULATOR			COML	
(4) 22	10	SN510	SOLID STATE MODULE WITH MYLAR INSULATOR			COML	
(7) 20	7	RMA 2001	MOUNT-TRANSISTOR			COML	
(6) 19	5	2N2369	TRANSISTOR			COML	
(6) 18	2	2N995	TRANSISTOR			COML	
(5) 16	2	KG22J15KMS	CAPACITOR	22μf ±10% 15V		COML	
(3) 15	2	CYFM15C331G	CAPACITOR	330pf ±2% 500V		COML	
(3) 12	1	RL07S	RESISTOR	68K ±2% 1/4W		COML	
11	1			10K			
10	2			6.8K			
9	2			5.1K			
8	2			3.3K			
7	3			1.5K			
(3) 6	4	RL07S	RESISTOR	330Ω ±2% 1/4W		COML	
3	38	910443-203	TERMINAL			DSCD	
2	1	11606-203-31	TEE-PCB ASSY				
1	1	10432-502-3	PCB	.062 x 3.06 x 4.81	①		
ITEM NO.	1	10432-502	FRAME SYNC & DATA OUPT				

LIST OF MATERIAL OR PARTS LIST

UNLESS OTHERWISE SPECIFIED			
DIMENSIONS ARE IN INCHES	DRAWN	O. HAMPTON	7-27-66
TOLERANCES ON	CHECK		8-4-66
DECIMALS: XX ± .03, XXX ± .010	APPD		
ANGLES: ± 0° 30'	APPD		
DRILLED HOLES: .040 TO .126 +.002 −.001; .136 TO .228 +.003 −.001; .234 TO .500 +.004 −.001; .515 TO .750 +.005 −.001; .765 TO 1.000 +.007 −.001; 1.015 TO 2.000 +.010 −.001	FINISH		
	HEAT TREAT		
	SURFACE ROUGHNESS PER MIL-STD-10	✓	

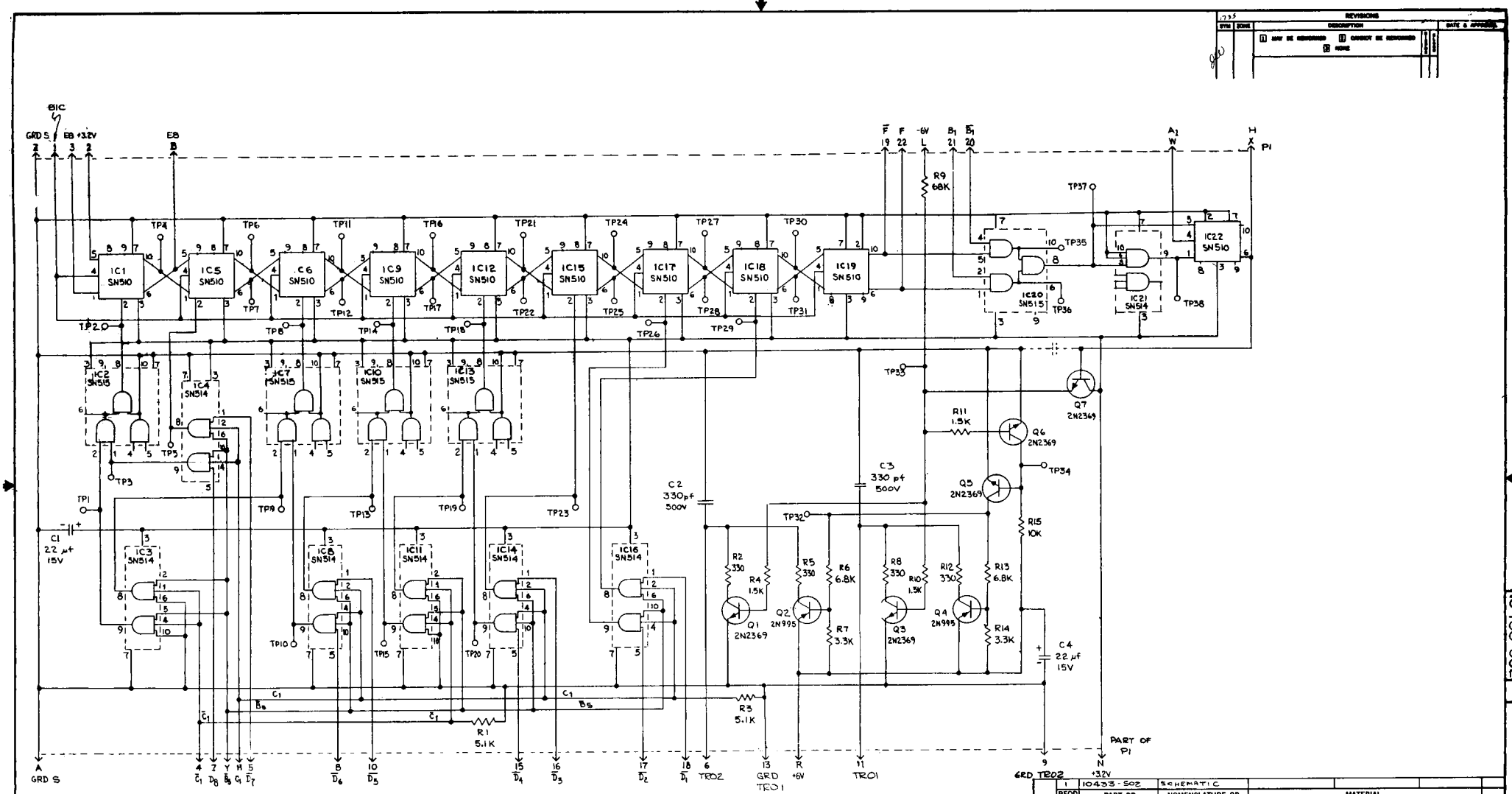
CALIFORNIA COMPUTER PRODUCTS INC.
305 MULLER, ANAHEIM, CALIFORNIA

FRAME SYNC & DATA OUTPUT

SCALE: 2/1	SIZE: F	10432-502
DO NOT SCALE THIS DRAWING	WEIGHT	SHEET

10432-502

FOLDOUT FRAME 2



NOTES: UNLESS OTHERWISE SPECIFIED
1. RESISTOR VALUES ARE IN OHMS ± 2% AND ARE ¼W
2. REF ASSY DWG NO 10432-502

REVISIONS			
SYM	ZONE	DESCRIPTION	DATE & APPROVAL
		[1] MAY BE REMOVED [2] CANNOT BE REMOVED [3] NONE	

REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SIZE, DESCRIPTION & SPECIFICATION	ZONE
1	10433-502	SCHEMATIC		

LIST OF MATERIAL OR PARTS LIST

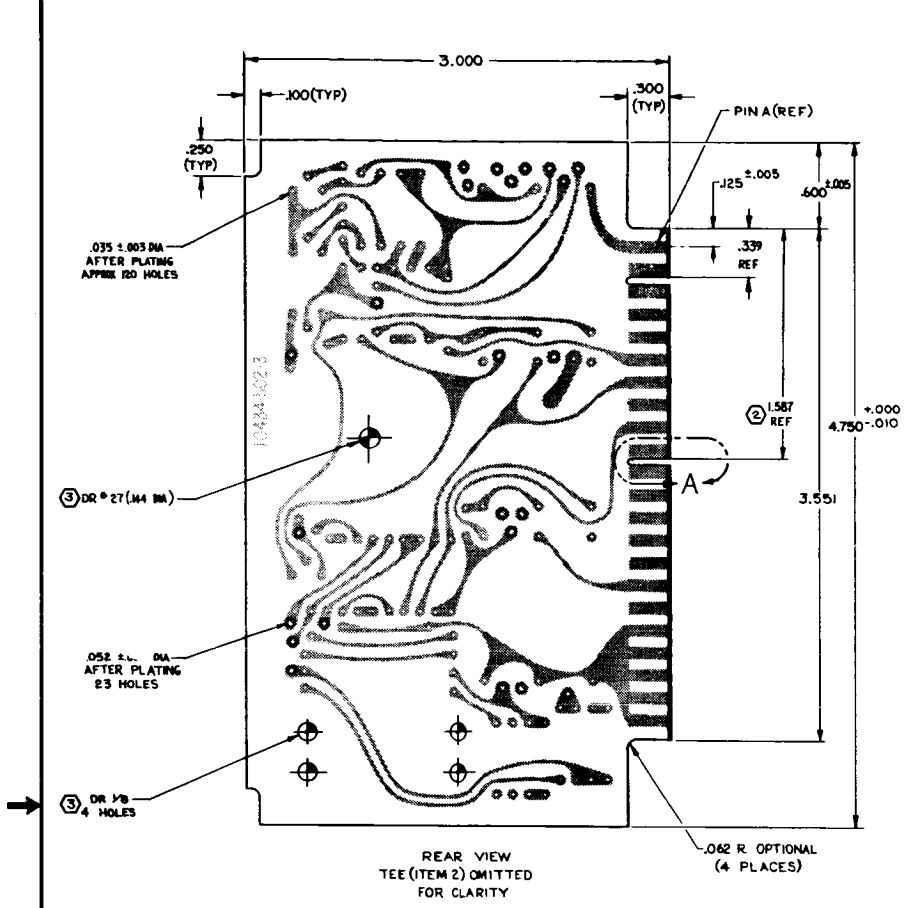
UNLESS OTHERWISE SPECIFIED	DRAWN	O. Hagopian 20 Dec 1965
DIMENSIONS ARE IN INCHES	CHECK	8-4-66
TOLERANCES ON DECIMALS XX ± .03 XXX ± .010; ANGLES ± 0° 30'	APPD	11-7-66
	APPD	10-3-66
	FINISH	
DRILLED HOLES .040 TO .128 +.002 −.001; .136 TO .228 +.003 −.001; .234 TO .500 +.004 −.001; .515 TO .750 +.005 −.001; .765 TO 1.000 +.007 −.001; 1.015 TO 2.000 +.010 −.001	HEAT TREAT	
	SURFACE ROUGHNESS PER MIL-STD-10	✓

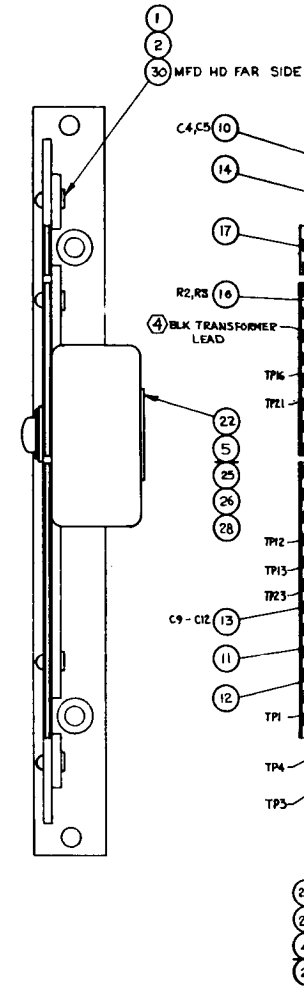
CALIFORNIA COMPUTER PRODUCTS INC.
308 MULLER, ANAHEIM, CALIFORNIA

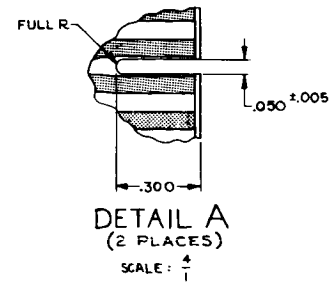
SCHEMATIC-
FRAME SYNC & DATA OUPT

SCALE:	SIZE	
NONE	D	10433-502
DO NOT SCALE THIS DRAWING	WEIGHT	SHEET

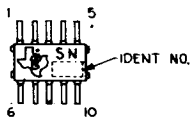
10433-502







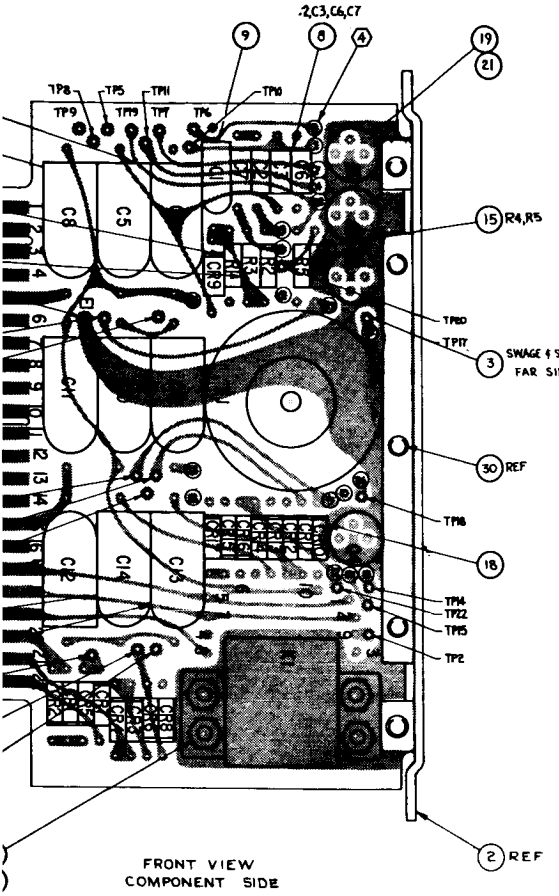
DETAIL A
(2 PLACES)
SCALE: 4/1



PIN ORIENTATION
OF MODULES
SCALE: 4/1

FOLDOUT FRAME

REVISIONS			
SYM	ZONE	DESCRIPTION	DATE & APPROVAL
		(1) MAY BE REMOVED (2) CANNOT BE REMOVED (3) NONE	



FRONT VIEW
COMPONENT SIDE

21. COAT PCB ASSY PER CCP SPEC A0108-004
(11) 20. VALUE TO BE DETERMINED AT FUNCTIONAL TEST
NOMINAL VALUE 750 Ω
(10) 19 MODULAR ELECTRONICS, INGLEWOOD, CALIF
(9) 18. DELBERT BLINN CO INC, POMONA, CALIF
(8) 17 HONEYWELL SEMI COND DIV, RIVIERA BEACH, FLA
(7) 16 RAYTHEON CO SEMI COND DIV., NEEDHAM HEIGHTS, MASS.
(6) 15 CORNING GLASS WORKS; BRADFORD, PA.
(5) 14. KEMET DEPT UNION CARBIDE CORP CLEVELAND, OHIO
(4) 13. TRANSFORMER LEADS TO BE SOLDERED AT PLACES INDICATED
(3) 12. DO NOT PLATE THRU
11. REF SCHEMATIC DWG NO. 10435-502
10. COMPONENT REF DESIGNATIONS ARE FOR LOCATING PURPOSES ONLY AND DO NOT APPEAR ON ACTUAL PART.
(2) 9. KEYSLOT DIMENSIONS ARE FOR REFERENCE ONLY, SLOT SHOULD BE CENTERED BETWEEN PINS AND MUST NOT TOUCH CIRCUITRY.
8. MATCH DRILL AND RIVET ITEMS 1 AND 2 USING JIG FIXTURE 11430-203
7. FABRICATE PER CCP SPEC A0105-008
6. SILK SCREEN USING SSM 10434-502-3
5. FABRICATE USING PCM 10434-502-3
(1) 4. EPOXY GLASS LAMINATE WITH 2 OZ COPPER BOTH SIDES, MIL-P-13949C, TYPE GE
3. PLATING TO BE PER CCP SPEC A0106-008
2. CHAMFER CONNECTOR TIP .020 x 30° BOTH SIDES
1. BOARD THICKNESS AT CONNECTOR TIP NOT TO EXCEED .065 +.003 -.005

NOTE: UNLESS OTHERWISE SPECIFIED

ITEM NO.	REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SIZE, DESCRIPTION & SPECIFICATION			ZONE
30	5	MS20470A2-4	RIVET				
29	4	MS35233-13	SCREW				
28	1	MS35233-31	SCREW				
27	4	MS35333-70	WASHER-LOCK				
26	1	MS35333-71	WASHER-LOCK				
25	1	AN960C6L	WASHER-FLAT				
24	4	AN340C4	NUT-HEX				
(10) 22	1	100-4	RETAINER-TOROID			COML	
(9) 21	4	FP-50	MOUNT-TRANSISTOR	TO-5		COML	
(8) 19	4	2N2658	TRANSISTOR	TO-5		COML	
(7) 18	17	IN3730	DIODE				
(6) 17	1	RL07S	RESISTOR	24K ±2% ¼W			
(6) 16	2	RL07S	RESISTOR	820Ω ±2% ¼W			
(6) 15	2	RL07S	RESISTOR	(11)			
(5) 14	1	KQ270J6KMS	CAPACITOR	270μf ±10% 6V			
13	4	KG120J15KMS		120μf ±10% 15V			
12	1	K682J20KMS		82μf ±10% 20V			
11	1	KG47J35KMS		47μf ±10% 35V			
10	2	KG22J50KMS		22μf ±10% 50V			
(5) 9	1	KG10J20KMS		10μf ±10% 20V			
(6) 8	4	CYK02BU223K	CAPACITOR	22,000pf ±10% 50V		COML	
5	1	910006-403	TRANSFORMER			DSCD	
4	1	11508-203	RELAY				
3	23	910443-203	TERMINAL			DSCD	
2	1	HGOG-203-G1	TFE-PCB ASSY				
1	1	10434-502-3	PCB	.062 x 3.06 x 4.81	(1)		
ITEM NO.	REQD	10434-502	DC/DC CONV #1				

LIST OF MATERIAL OR PARTS LIST

UNLESS OTHERWISE SPECIFIED			
DIMENSIONS ARE IN INCHES	DRAWN	D. HAMPTON	7-27-66
TOLERANCES ON	CHECK		8-4-66
DECIMALS: XX ± .03, XXX ± .010	APPD		
ANGLES: ± 0° 30'	APPD		
DRILLED HOLES	FINISH		
.040 TO .1285 +.002, -.001			
.136 TO .228 +.003, -.001	HEAT TREAT		
.234 TO .500 +.004, -.001			
.515 TO .750 +.005, -.001			
.765 TO 1.000 +.007, -.001	SURFACE ROUGHNESS PER MIL-STD-10	✓	
1.015 TO 2.000 +.010, -.001			

CALIFORNIA COMPUTER PRODUCTS INC.
305 MULLER, ANAHEIM, CALIFORNIA

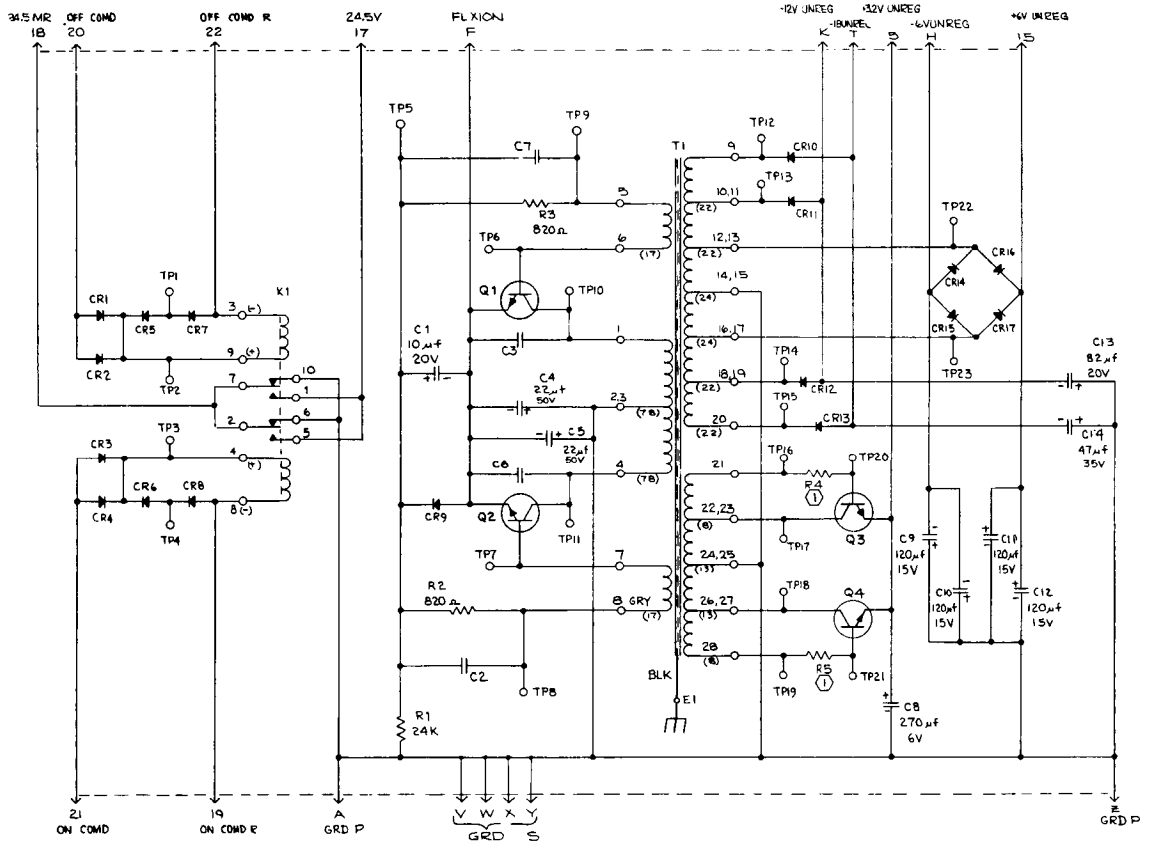
DC/DC CONVERTER NO. 1

SCALE: 2/1	SIZE: F	10434-502
DO NOT SCALE THIS DRAWING	WEIGHT	SHEET

10434-502

FOLDOUT FRAME 2

FOLDOUT FRAME 1



REVISIONS			
SYM	ZONE	DESCRIPTION	DATE & APPROVAL
		1 MAY BE REWORKED 2 CANNOT BE REWORKED 3 NONE	

(1) 6. NOMINAL VALUE 750Ω
5. RESISTOR VALUES ARE IN OHMS ±2% AND ARE ¼W
4. REF ASSY DWG NO. 10434-502
3. CAPACITORS ARE 22000 pf ± 10% 50V
2. TRANSISTORS ARE 2N2658
1. DIODES ARE IN3730
NOTE: UNLESS OTHERWISE SPECIFIED

REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SIZE, DESCRIPTION & SPECIFICATION	ZONE
1	10435-502	SCHEMATIC		

LIST OF MATERIAL OR PARTS LIST

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS: XX ± .03, XXX ± .010
ANGLES ± 0° 30'
DRILLED HOLES
.040 TO .128 ± .002, — .001
.136 TO .228 ± .003, — .001
.234 TO .500 ± .004, — .001
.515 TO .750 ± .005, — .001
.765 TO 1.000 ± .007, — .001
1.015 TO 2.000 ± .010, — .001

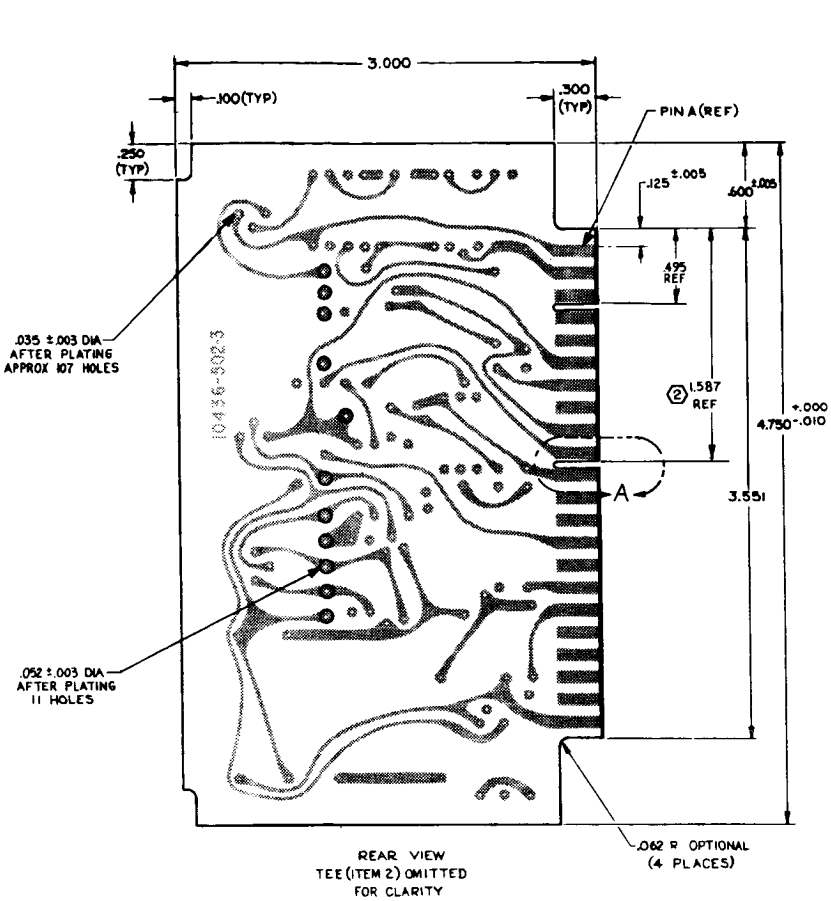
DRAWN O. THOMPSON 7-6-66
CHECK 8-5-66
APPD 10-7-66
APPD 10-3-66
FINISH
HEAT TREAT
SURFACE ROUGHNESS PER MIL-STD-10 ✓

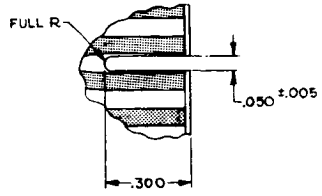
CALIFORNIA COMPUTER PRODUCTS INC.
305 MULLER, ANAHEIM, CALIFORNIA

SCHEMATIC-
DC TO DC CONVERTER
NO. 1

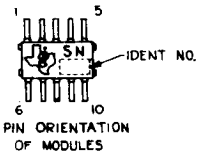
SCALE: NONE
SIZE: D
10435-502
DO NOT SCALE THIS DRAWING
WEIGHT
SHEET

10435-502





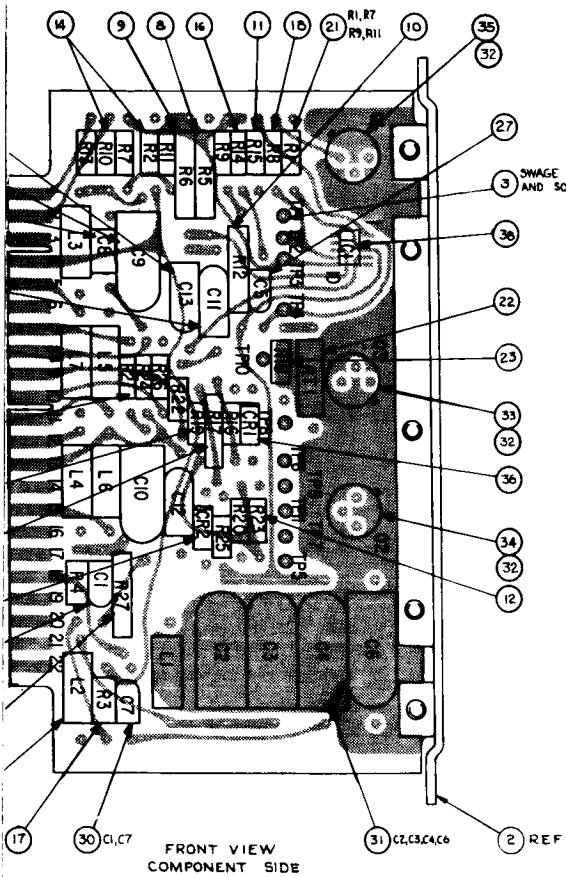
DETAIL A
(2 PLACES)
SCALE: 4/1



PIN ORIENTATION
OF MODULES
SCALE: 4/1

FOLDOUT FRAME 1

REVISIONS				
SYM	ZONE	DESCRIPTION		DATE & APPROVAL
A		1. REVISED P/O TO AGREE WITH SSM & PCM CHANGE EFFECT ON: NEXT PARTS ORDER		2-1-67 (EC 1747)



ITEM NO.	REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SIZE, DESCRIPTION & SPECIFICATION		ZONE
40	5	MS20470A2-4	RIVET			
39	7	9320-30	CHOKE	10 µh ±10%		COML
38	1	SN521/SN931	SOLID STATE MODULE WITH MYLAR INSULATOR			
37	1	IN753A	DIODE ZENER			
36	1	IN759A	DIODE ZENER			
35	1	2N2927	TRANSISTOR			
34	1	2N1132	TRANSISTOR			
33	1	2N2658	TRANSISTOR			COML
32	3	FP-50	MOUNT-TRANSISTOR			COML
31	4	KG22J50KMS	CAPACITOR	22 µf ±10% 50V		COML
30	2	KGR056J50KMS		056 µf ±10% 50V		
29	1	CYK02BU223K		22,000 pf ±10% 50V		
28	2	KG22J35KMS		22 µf ±10% 35V		
27	1	KG2R2J20KMS		2.2 µf ±10% 20V		
26	2	KG22J15KMS		22 µf ±10% 15V		
25	1	KG27J10KMS	CAPACITOR	27 µf ±10% 10V		COML
23	1	RL07S	RESISTOR	12K ±2% 1/4W		COML
22	1	TM-1/8	SENSISTOR	2.7K ±5% 1/8W		COML
21	4	RL07S	RESISTOR	(3) ±2% 1/4W		
20	1	MEA-TO		200K ±1% 1/8W		
19	1	RL07S		51K ±2% 1/4W		
18	1			27K		
17	1			24K		
16	1			22K		
15	3			10K		
14	2			5.6K		
13	6			4.7K		
12	1			1K		
11	1	RL07S		51Ω ±2% 1/4W		
10	1	MEA-TO		61.9K ±1% 1/8W		
9	1	MEA-TO		56.2K ±1% 1/8W		
8	1	MEA-TO	RESISTOR	464K ±1% 1/8W		COML
7	1	RL20S	RESISTOR	12 Ω ±2% 1/2W		COML
3	11	910443-203	TERMINAL			- DSCD
2	1	11606-203-71	TEE-PCB ASSY			
1	1	10436-502-3	PCB	.062 × 3.06 × 4.81	(1)	
ITEM NO.	1	10436-502				

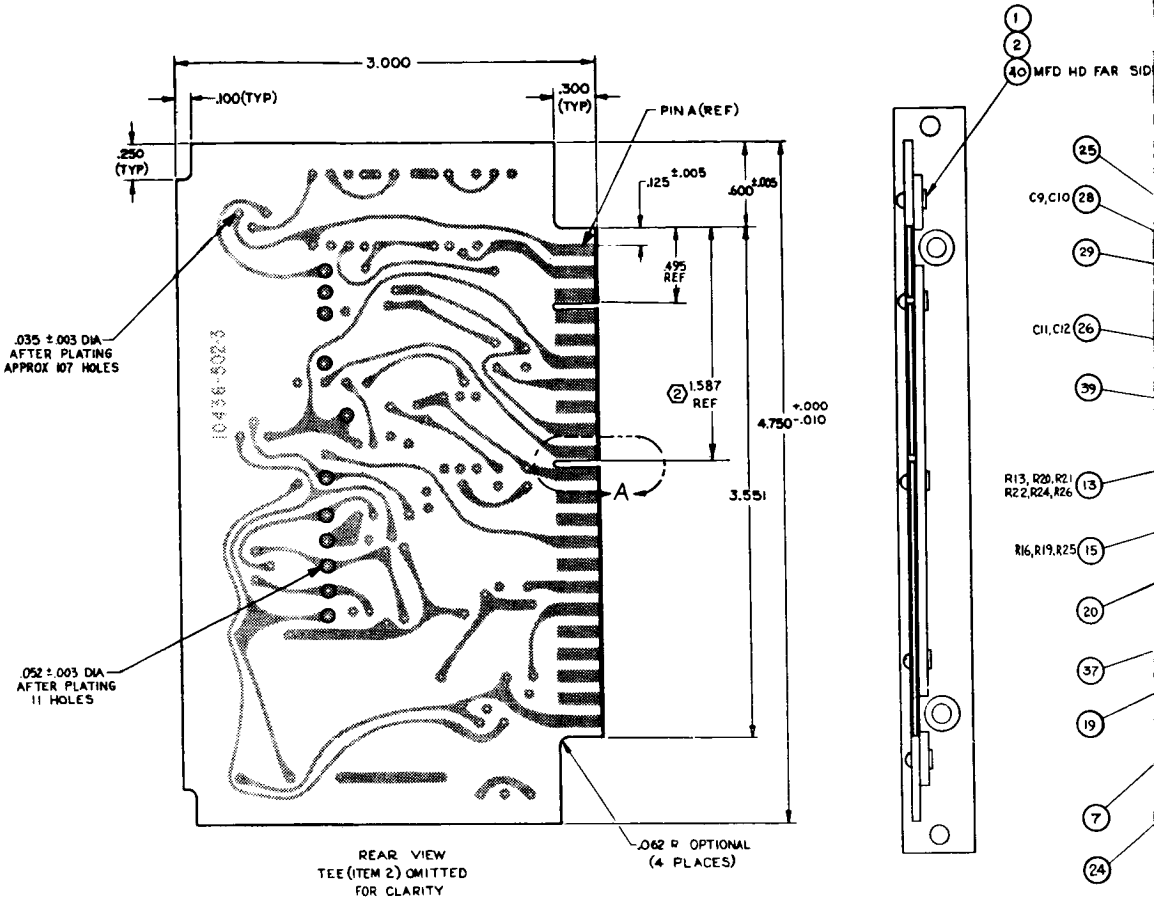
LIST OF MATERIAL OR PARTS LIST

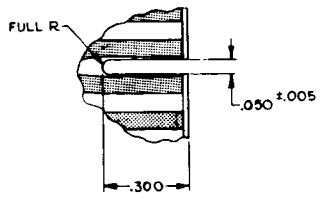
2. COAT PCB ASSY PER CCP SPEC A0108-004
(13) 22. DELBERT BLINN CO INC, POMONA, CALIF
(12) 21. J.W MILLER CO LOS ANGELES, CALIF
(11) 20. MOTOROLA SEMICOND PROD INC, PHOENIX, ARIZ
(10) 19. SYLVANIA ELECTRIC PROD INC, WOBURN MASS
(9) 18. FAIRCHILD SEMICONDUCTOR DIV MOUNTAINVIEW, CALIF
(8) 17. HONEYWELL SEMICONDUCTOR DIV; RIVIERA BEACH, FLA
(7) 16. KEMET DEPT UNION CARBIDE CORP; CLEVELAND, OHIO
(6) 15. TEXAS INSTRUMENTS CORP; DALLAS TEXAS
(5) 14. CORNING GLASS WORKS; BRADFORD, PA.
(4) 13. INTERNATIONAL RESISTANCE CORP, PHILADELPHIA, PA.
(3) 12. VALUE TO BE DETERMINED AT FUNCTIONAL TEST
11. REF SCHEMATIC DWG NO. 10437-502
10. COMPONENT REF DESIGNATIONS ARE FOR LOCATING PURPOSES ONLY AND DO NOT APPEAR ON ACTUAL PART.
(2) 9. KEYSLOT DIMENSIONS ARE FOR REFERENCE ONLY, SLOT SHOULD BE CENTERED BETWEEN PINS AND MUST NOT TOUCH CIRCUITRY.
8. MATCH DRILL AND RIVET ITEMS 1 AND 2 USING JIG FIXTURE 11430-203
7. FABRICATE PER CCP SPEC A0105-008
6. SILK SCREEN USING SSM 10436-502-3, REV A
5. FABRICATE USING PCM 10436-502-3, REV A
(1) 4. EPOXY GLASS LAMINATE WITH 2 OZ COPPER BOTH SIDES, MIL-P-13949C, TYPE GE
3. PLATING TO BE PER CCP SPEC A0105-008
2. CHAMFER CONNECTOR TIP .020 × 30° BOTH SIDES
1. BOARD THICKNESS AT CONNECTOR TIP NOT TO EXCEED .065 +.003 −.005
NOTE: UNLESS OTHERWISE SPECIFIED

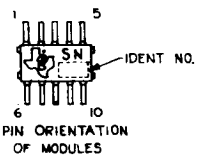
UNLESS OTHERWISE SPECIFIED	DRAWN		CALIFORNIA COMPUTER PRODUCTS INC. 385 MULLER, ANAHEIM, CALIFORNIA
DIMENSIONS ARE IN INCHES TOLERANCES ON DECIMALS XX ± .03 XXX ± .010 ANGLES ± 0° 30'	CHECK		DC/DC CONVERTER NO. 2
	APPD	11-7-66	
	APPD	10-3-66	
DRILLED HOLES .040 TO .125 +.002 −.001; .125 TO .234 +.003 −.001; .234 TO .500 +.004 −.001; .515 TO .750 +.005 −.001; .765 TO 1.000 +.007 −.001; 1.015 TO 2.000 +.010 −.001	FINISH		
	HEAT TREAT		SCALE: 2/1 SIZE F 10436-502
SURFACE ROUGHNESS PER MIL-STD-10 ✓			DO NOT SCALE THIS DRAWING WEIGHT SHEET

10436-502A1

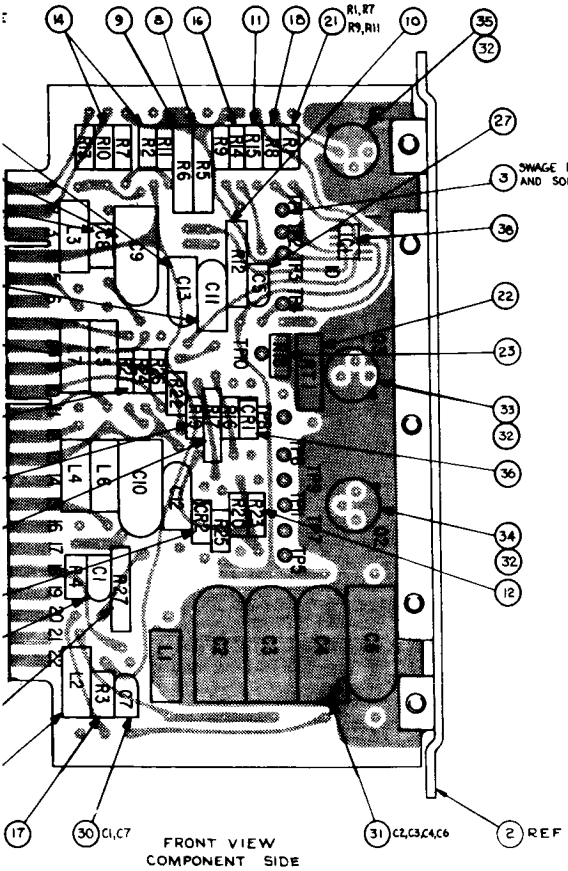
FOLDOUT FRAME 2


3.000
.100(TYP)
.300
(TYP)
.250
(TYP)
PIN A(REF)
.125 ±.005
.600 ±.005
.495
REF
.035 ±.003 DIA
AFTER PLATING
APPROX 107 HOLES
1.587
REF
+.000
4.750 -.010
A
3.551
.052 ±.003 DIA
AFTER PLATING
11 HOLES
.062 R OPTIONAL
(4 PLACES)
REAR VIEW
TEE (ITEM 2) OMITTED
FOR CLARITY
MFD HD FAR SIDE
C9,C10
C11,C12
R13, R20, R21
R22, R24, R26
R16, R19, R25


FULL R
.050 ±.005
.300
DETAIL A
(2 PLACES)
SCALE: 4/1


1
5
SN
IDENT NO.
6
10
PIN ORIENTATION
OF MODULES
SCALE: 4/1

REVISIONS				
SYM	ZONE	DESCRIPTION		DATE & APPROVAL
		A MAY BE REWORKED B CANNOT BE REWORKED C NONE		
A		1. REVISED FID TO AGREE WITH SSM & PCM CHANGE EFFECT ON: NEXT PARTS ORDER		2-1-67 (EC 1141)



ITEM NO.	REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SIZE, DESCRIPTION & SPECIFICATION		ZONE
40	5	MS20470A2-4	RIVET			
39	7	9320-30	CHOKE	10 µh ±10%		COML
38	1	SN521/SN931	SOLID STATE MODULE WITH MYLAR INSULATOR			
37	1	IN753A	DIODE ZENER			
36	1	IN759A	DIODE ZENER			
35	1	2N2927	TRANSISTOR			
34	1	2N1132	TRANSISTOR			
33	1	2N2658	TRANSISTOR			COML
32	3	FP-50	MOUNT-TRANSISTOR			COML
31	4	KG22J50KMS	CAPACITOR	22 µf ±10% 50V		COML
30	2	KGR056J50KMS	"	.056 µf ±10% 50V		"
29	1	CYK02BU223K	"	22,000 pf ±10% 50V		"
28	2	KG22J35KMS	"	22 µf ±10% 35V		"
27	1	KG2R2J20KMS	"	2.2 µf ±10% 20V		"
26	2	KG22J15KMS	"	22 µf ±10% 15V		"
25	1	KG27J10KMS	CAPACITOR	27 µf ±10% 10V		COML
23	1	RL07S	RESISTOR	12K ±2% 1/4W		COML
22	1	TM-1/8	SENSISTOR	2.7K ±5% 1/8W		COML
21	4	RL07S	RESISTOR	(3) ±2% 1/4W		"
20	1	MEA-TO	"	200K ±1% 1/8W		"
19	1	RL07S	"	51K ±2% 1/4W		"
18	1	"	"	27K		"
17	1	"	"	24K		"
16	1	"	"	22K		"
15	3	"	"	10K		"
14	2	"	"	5.6K		"
13	6	"	"	4.7K		"
12	1	"	"	1K		"
11	1	RL07S	"	51Ω ±2% 1/4W		COML
10	1	MEA-TO	"	61.9K ±1% 1/8W		"
9	1	MEA-TO	"	56.2K ±1% 1/8W		"
8	1	MEA-TO	RESISTOR	464K ±1% 1/8W		COML
7	1	RL20S	RESISTOR	12 Ω ±2% 1/2W		COML
3	11	910443-203	TERMINAL			DSCD
2	1	11606-203-71	TEE-PCB ASSY			
1	1	10436-502-3	PCB	.062 × 3.06 × 4.81	(1)	
ITEM NO.	1	10436-502				

LIST OF MATERIAL OR PARTS LIST

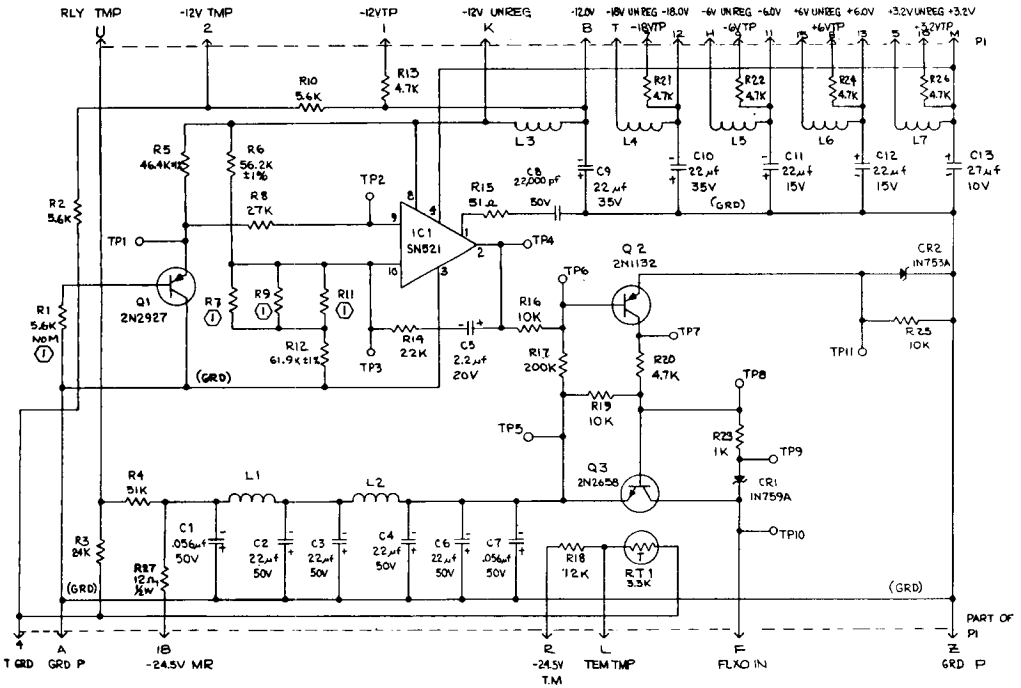
(23) COAT PCB ASSY PER CCP SPEC A0108-004
(13) (22) DELBERT BLINN CO INC, POMONA, CALIF
(12) (21) J.W MILLER CO. LOS ANGELES, CALIF
(11) (20) MOTOROLA SEMICOND PROD INC, PHOENIX, ARIZ.
(10) (19) SYLVANIA ELECTRIC PROD INC, WOBURN MASS.
(9) (18) FAIRCHILD SEMICONDUCTOR DIV MOUNTAINVIEW, CALIF
(8) (17) HONEYWELL SEMICONDUCTOR DIV; RIVIERA BEACH, FLA
(7) (16) KEMET DEPT UNION CARBIDE CORP; CLEVELAND, OHIO
(6) (15) TEXAS INSTRUMENTS CORP; DALLAS TEXAS
(5) (14) CORNING GLASS WORKS; BRADFORD, PA.
(4) (13) INTERNATIONAL RESISTANCE CORP, PHILADELPHIA, PA.
(3) (12) VALUE TO BE DETERMINED AT FUNCTIONAL TEST
(11) REF SCHEMATIC DWG NO. 10437-502
(10) COMPONENT REF DESIGNATIONS ARE FOR LOCATING PURPOSES ONLY AND DO NOT APPEAR ON ACTUAL PART.
(2) (9) KEYSLOT DIMENSIONS ARE FOR REFERENCE ONLY, SLOT SHOULD BE CENTERED BETWEEN PINS AND MUST NOT TOUCH CIRCUITRY.
(8) MATCH DRILL AND RIVET ITEMS 1 AND 2 USING JIG FIXTURE 11430-203
(7) FABRICATE PER CCP SPEC A0105-008
(6) SILK SCREEN USING SSM 10436-502-3, REV A
(5) FABRICATE USING PCM 10436-502-5, REV A
(1) (4) EPOXY GLASS LAMINATE WITH 2 OZ COPPER BOTH SIDES, MIL-P-13949C, TYPE GE
(3) PLATING TO BE PER CCP SPEC A0105-008
(2) CHAMFER CONNECTOR TIP .020 × 30° BOTH SIDES
(1) BOARD THICKNESS AT CONNECTOR TIP NOT TO EXCEED .065 +.003 −.008

NOTE: UNLESS OTHERWISE SPECIFIED

UNLESS OTHERWISE SPECIFIED	DRAWN	CALIFORNIA COMPUTER PRODUCTS INC.
DIMENSIONS ARE IN INCHES	CHECK	385 MULLER, ANAHEIM, CALIFORNIA
TOLERANCES ON DECIMALS XX ± .03 XXX ± .010 ANGLES ± 0° 30'	APPD	DC/DC CONVERTER NO. 2
DRILLED HOLES .040 TO .125 +.002 −.001; .126 TO .234 +.003 −.001; .235 TO .515 +.004 −.001; .516 TO .765 +.005 −.001; .766 TO 1.015 +.007 −.001; 1.015 TO 2.500 +.010 −.001	APPD	
	FINISH	
	HEAT TREAT	SCALE: 2/1
SURFACE ROUGHNESS PER MIL-STD-10 ✓	DO NOT SCALE THIS DRAWING	SIZE F — 10436-502
		WEIGHT — SHEET

10436-502A1

FOLDOUT FRAME 2



6. R27 LOCATED OUT OF SEQUENCE
5. CAPACITOR VALUES ARE IN MICRO FARADS ± 10%
4. REF ASSY DWG NO. 10436-502.
① 3. VALUE TO BE DETERMINED AT FUNCTIONAL TEST
2. CHOKES ARE TYPE 9320-30, 10 mh
1. RESISTOR VALUES ARE IN OHMS ±2% AND ARE ¼W
NOTE: UNLESS OTHERWISE SPECIFIED

REVISIONS			
SYM	ZONE	DESCRIPTION	DATE & APPROVAL
		1 MAY BE REWORKED 2 CANNOT BE REWORKED 3 NONE	

REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SIZE, DESCRIPTION & SPECIFICATION	ZONE
1	10437-502	SCHEMATIC		

LIST OF MATERIAL OR PARTS LIST

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS XX ± .03, XXX ± .010
ANGLES ± 0° 30'
DRILLED HOLES
.040 TO .128 +.002 −.001
.136 TO .228 +.003 −.001
.234 TO .500 +.004 −.001
.515 TO .750 +.005 −.001
.765 TO 1.000 +.007 −.001
1.015 TO 2.000 +.010 −.001

DRAWN C. HARRISON 5-3-66
CHECK 5-3-66
APPD E. Miller 5-16-66
APPD J. Smith 5-20-66
FINISH
HEAT TREAT
SURFACE ROUGHNESS PER MIL-STD-10 ✓
DO NOT SCALE THIS DRAWING

CALIFORNIA COMPUTER PRODUCTS INC.
305 MULLER, ANAHEIM, CALIFORNIA

SCHEMATIC - DC TO DC CONVERTER NO. 2

SCALE: NONE
SIZE D
10437-502
WEIGHT
SHEET

10437-502

APPENDIX B

MRIR-T/ME

MECHANICAL DRAWINGS

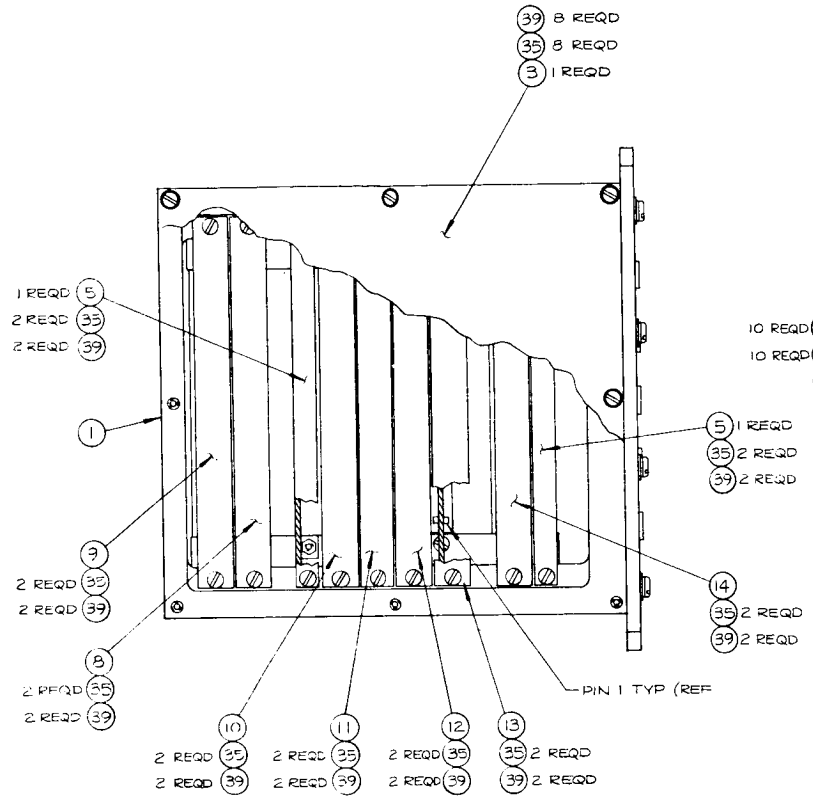
APPENDIX B

MRIR-T/ME
MECHANICAL DRAWINGS

The following section contains the mechanical drawings for the MRIR-T/ME unit.

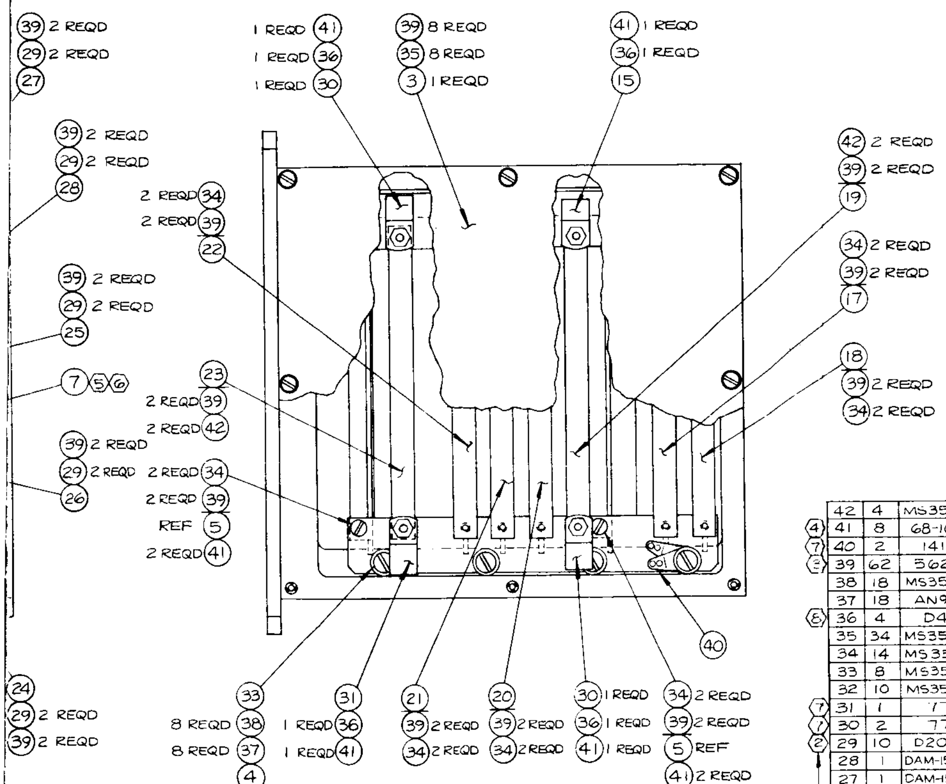
B.1 LIST OF DRAWINGS

10015-102	MRIR-PCM Digital Subsystem
11413-203	Housing, PCM MRIR-PCM
11411-203	Connector Plate MRIR-PCM
11415-203	Cover Housing, MRIR-PCM
11416-203	Plate Mounting Connector, MRIR-PCM
11414-203	Shield, PCB MRIR-PCM
11527-203	Connector Adapter
11606-203	Tee, PCB Assembly



FOLDOUT FRAME

1452 1519, 1673		REVISIONS	
SYM	ZONE	DESCRIPTION	DATE & APPROVAL
		[1] MAY BE REWORKED [2] CANNOT BE REWORKED [3] NONE (DISPOS / CLASS)	
A		1. IN L/M: DAM-15P CONN. WAS DBM-15P, DAM-15S CONN. WAS DBM-15S (3) 2. IN L/M & F/D ADDED: TERM. LUG #1416-6, 2 REQD (1) 3. IN L/M & F/D ADDED: "D" WASHER #D4-140, 4 REQD; CABLE CLAMP #775, 1 REQD; CABLE CLAMP #773 2 REQD; CABLE CLAMP #771, 1 REQD; PLUG-JUMPER #11507-203, 1 REQD; SCREW, PAN HD #MS35233-18, 4 REQD (1) 4. IN L/M: NUT, SELF-LOCKING #68-1660-40, 8 REQD WAS 4 REQD; SCREW, PAN HD. #MS35233-15, 14 REQD WAS 18 REQD (1) 5. ADDED G/N'S #10 & 11 EFFECT ON: ITEMS 1, 3, 4 & 5 = UNIT 2 & SUBS; ITEM 2 = ALL PARTS	E.O. 1356 HENEGAR 4-20-66
B		1. IN L/M 10424-502 WAS 10351-502, 10426-502 WAS 10367-502, 10428-502 WAS 10365-502, 10430-502 WAS 10353-502, 10432-502 WAS 10355-502, 10436-502 WAS 10371-502, & 10434-502 WAS 10370-502 EFFECT ON: P001 & SUBS	8-15-66



	ITEM NO	REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SIZE, DESCRIPTION & SPECIFICATION	ZONE
	42	4	MS35233-18	SCREW, PAN HD.	4-40X5/8	
4	41	8	68-1660-40	NUT, SELF-LOCKING	4-40	
7	40	2	1416-6	TERM. LUG		
3	39	62	5622-9	WASHER, MYLAR	#4	
	38	18	MS35337-79	L'WASHER, SPLIT	#6	
	37	18	AN960C6	WASHER, FLAT	#6	
8	36	4	D4-140	"D" WASHER		
	35	34	MS35233-13	SCREW, PAN HD.	4-40 x 1/4	
	34	14	MS35233-15	SCREW, PAN HD	4-40 x 3/8	
	33	8	MS35233-28	SCREW, PAN HD.	6-32 x 3/8	
	32	10	MS35233-29	SCREW, PAN HD	6-32 x 7/16	
7	31	1	775	CABLE CLAMP		
7	30	2	773	CABLE CLAMP		
2	29	10	D20418-10	SCREW LOCK		
	28	1	DAM-15P-NMB-1	CONNECTOR		
	27	1	DAM-15S-NMB-1			
	26	1	DEM-9P-NMB-1			
	25	1	DEM-9S-NMB-1			
2	24	1	DCM-37S-NMB-1	CONNECTOR		
1	23	1	BR-22-DRX1-23-56	CONNECTOR-PCB		
	22	1	-23-67			
	21	1	-23-78			
	20	1	-23-89			
	19	1	-23-910			
	18	1	-34-1011			
1	17	1	BR-22-DRX1-23-1011	CONNECTOR-PCB		
	16	1	11507-203	PLUG-JUMPER		
7	15	1	771	CABLE CLAMP		
	14	1	10424-502	ANALOG IN. & 25KC		
	13	1	10426-502	A/D CONVERTER		
	12	1	10428-502	A/D DATA CONTROL		
	11	1	10430-502	ENCODE TIMING GEN		
	10	1	10432-502	FRAME SYNC & D. OUT.		
	9	1	10436-502	DC/DC CONVERT. #2		
	8	1	10434-502	DC/DC CONVERT. #1		
5	7	1	11429-203	NAMEPLATE		
	6	1	W/L 10015-102	WIRE LIST		
	5	2	11414-203	SHIELD-P.C.B.		
	4	2	11416-203	PLATE-MTG., CONN.		
	3	2	11415-203	COVER, HOUSING		
	2	1	11411-203	CONN. PLATE		
	1	1	11413-203	HOUSING, P.C.B.		
		1	10015-102	MRIR-PCM		

LIST OF MATERIAL OR PARTS LIST

(8) 11. WECKESSER CO., INC., CHICAGO, ILL.
(7) 10. H.H. SMITH INC., BROOKLYN, N.Y.
9. ALL THREADED FASTENERS WILL BE TORQUED TO THE FOLLOWING VALUES:
#4 FASTENER = 5.2 INCH POUNDS
#6 FASTENER = 9.6 INCH POUNDS
(6) 8. EPOXY IN PLACE APPROX. WHERE SHOWN
(5) 7. ELECTROETCH NAMEPLATE USING .10 HIGH CHARACTERS:
NAME: MRIR-PCM MODEL: 221
PART NO: 10015-102 SER NO: (AS REQD)
6. INSTALL ALL HARDWARE WITH LOCTITE, GRADE A; LOCKTITE CORP, NEWINGTON, CONN.
5. WIRE PER W/L 10015-102
(4) 4. ELASTIC STOP NUT CORP, UNION, N.J.
(3) 3. SEASTROM MFG. CO., GLENDALE, CALIF.
(2) 2. CANNON ELECTRIC, LOS ANGELES, CALIF.
(1) 1. MASTERITE INDUSTRIES, INGLEWOOD, CALIF.

NOTE: UNLESS OTHERWISE SPECIFIED

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS: .XX ± .03, .XXX ± .010
ANGLES: ± 0° 30'

DRILLED HOLES
.040 TO .1285: + .002, -.001
.136 TO .228: + .003, -.001
.234 TO .500: + .004, -.001
.515 TO .750: + .005, -.001
.765 TO 1.000: + .007, -.001
1.015 TO 2.000: + .010, -.001

DRAWN	B. HENEGAR	1-27-66
CHECK		2-1-66
APPD		2-1-66
APPD		

FINISH

HEAT TREAT

SURFACE ROUGHNESS PER MIL-STD-10 ✓

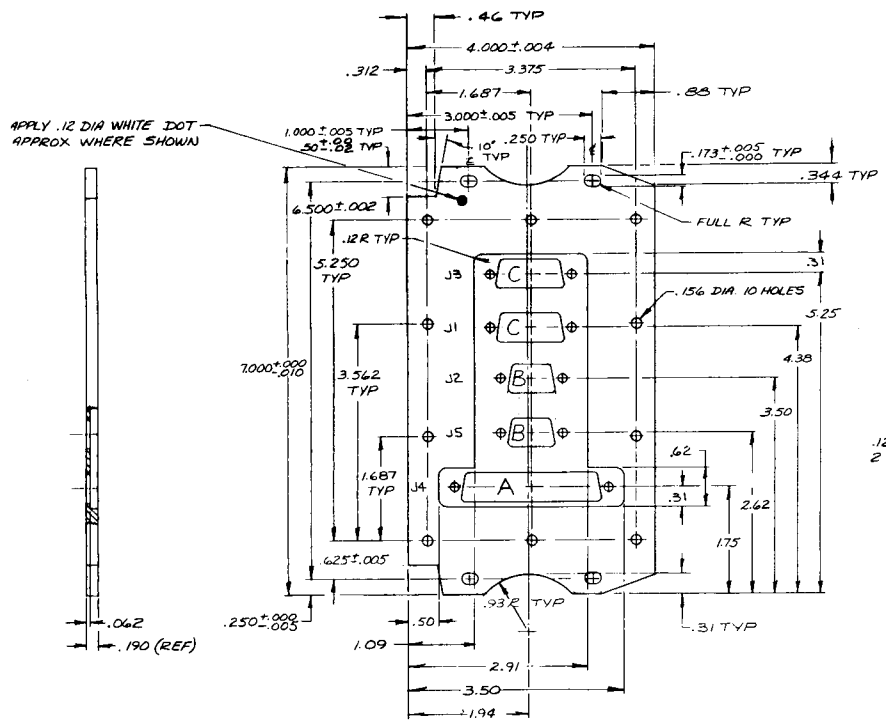
CALIFORNIA COMPUTER PRODUCTS INC.
305 MULLER, ANAHEIM, CALIFORNIA

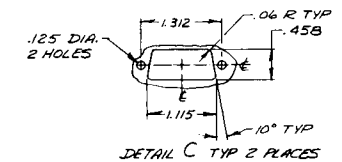
MRIR-PCM
DIGITAL SUB-SYSTEM

SCALE: 1/1 | SIZE F | 10015-102
DO NOT SCALE THIS DRAWING | WEIGHT | SHEET 1 OF 1

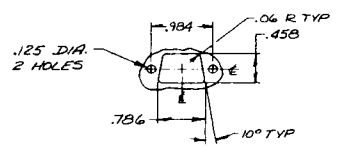
B 10015-102

FOLDOUT FRAME 2

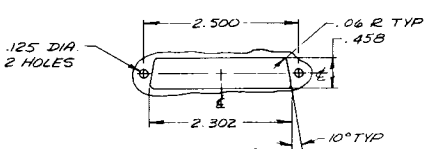




DETAIL C TYP 2 PLACES



DETAIL B TYP 2 PLACES



DETAIL A

REVISIONS				
SYM	ZONE	DESCRIPTION [1] MAY BE REWORKED [2] CANNOT BE REWORKED [3] NONE	CLASS	DATE & APPROVAL
A		1. ON F/D: .88 TYP WAS .875 TYP, .344 TYP WAS .250 TYP, .31 TYP WAS .250 +.005 -.005, .93 R TYP WAS 1.156 R TYP 2. ADDED .46 TYP, 10° TYP & .50 +.02 -.02 TYP EFFECT ON: UNIT 2 & SUBS	2 2	ARC 7/29/66
B		1. G/N #3: WAS DOW # 17 PER MIL-M-45202. EFFECT ON: P001 & SUBS		S. KEY 9-30-66

5. TAG WITH PART NO PER CCP SPEC A0104-001
4. 63 ALL MACHINED SURFACES
(1) 3. DOW # 23 PER CCP SPEC A0109-005
2. RUBBER STAMP DESIG. APPROX. WHERE SHOWN PER CCP SPEC A0104-001 USING BLACK INK.
1. MACHINE PER CCP SPEC A0102-001

NOTE: UNLESS OTHERWISE SPECIFIED

REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SIZE, DESCRIPTION & SPECIFICATION	ZONE
1	11411-203	CONN. PLATE	.190 × 4.06 × 7.06 AZ31B-H24 MAG ALY QQ-M-44	

LIST OF MATERIAL OR PARTS LIST

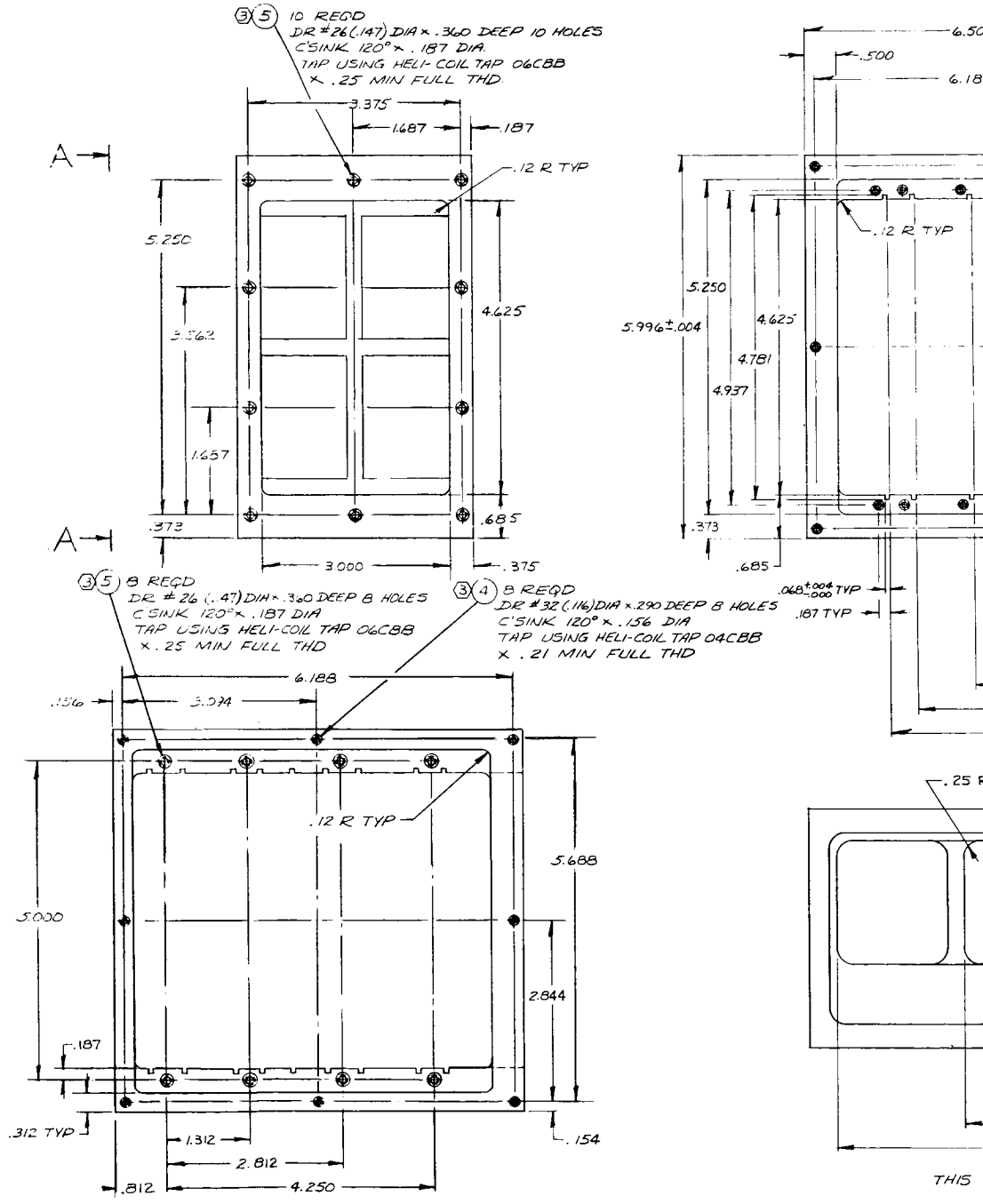
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS: XX ± .03, XXX ± .010
ANGLES ± 0° 30'
DRILLED HOLES
.040 TO .1285 +.002, —.001
.136 TO .228 +.003, —.001
.234 TO .500 +.004, —.001
.515 TO .750 +.005, —.001
.765 TO 1.000 +.007, —.001
1.015 TO 2.000 +.010, —.001

DRAWN D. MILLER 12-28-65
CHECK E. Hennigan 1-21-66
APPD [illegible] 2-1-66
APPD J. Pluck Jr 2-1-66
FINISH (1)
HEAT TREAT
SURFACE ROUGHNESS PER MIL-STD-10 ✓

CALIFORNIA COMPUTER PRODUCTS INC.
305 MULLER, ANAHEIM, CALIFORNIA

CONN. PLATE
MRIR-PCM

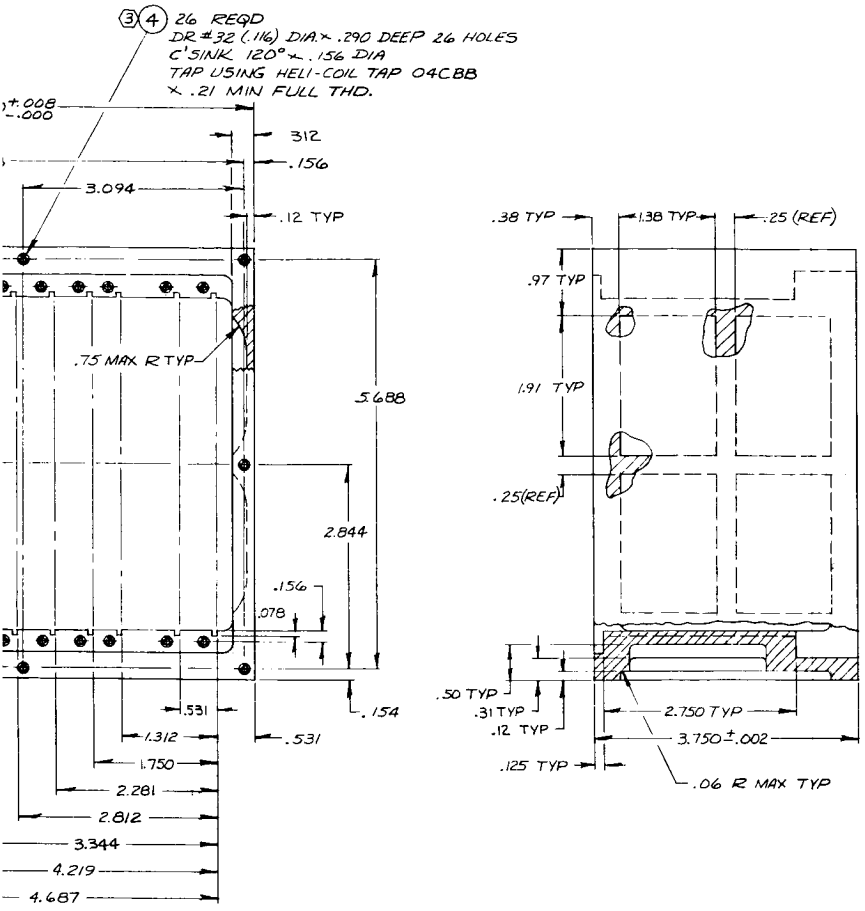
SCALE: FULL
SIZE: D
11411-203
DO NOT SCALE THIS DRAWING
WEIGHT
SHEET 1 OF 1

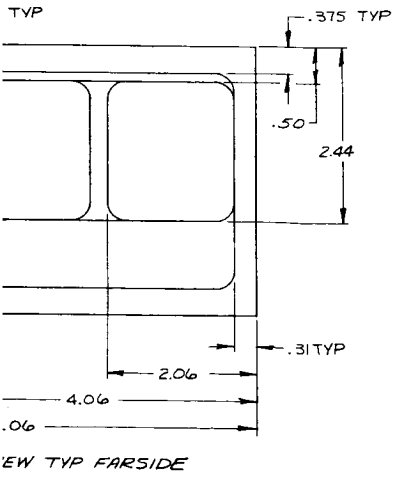


VIEW A-A

FOLDOUT FRAME 1

REVISIONS				
SYM	ZONE	DESCRIPTION [1] MAY BE REWORKED [2] CANNOT BE REWORKED [3] NONE	DESIGN	DATE & APPROVAL
A		1. G/N#3: WAS DOW# 17 PER MIL-M-45202. 2. G/N#5: WAS DIP IN ZINC-CHROMATE BEFORE INSTALLING EFFECT ON: P001 & SUBS		9. KEY 9-30-66





ITEM NO	REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SIZE, DESCRIPTION & SPECIFICATION	ZONE
① 5	18	3585-06CN×.207	INSERT		COML
① 4	34	3585-04CN×.168	INSERT		COML
1	1	-3	HOUSING	7.00 DIA. × 3.81	ZK60A-T5 MAG ALY QQ-M-31
17EM 1	1	11413-203	HOUSING, PCB		

LIST OF MATERIAL OR PARTS LIST

UNLESS OTHERWISE SPECIFIED			
DIMENSIONS ARE IN INCHES TOLERANCES ON DECIMALS: XX ± .03, XXX ± .010 ANGLES ± 0° 30' DRILLED HOLES .040 TO .1285: +.002, —.001 .136 TO .228: +.003, —.001 .234 TO .500: +.004, —.001 .515 TO .750: +.005, —.001 .765 TO 1.000: +.007, —.001 1.015 TO 2.000: +.010, —.001	DRAWN	D. MILLER	12-29-65
	CHECK	R. Uemura	1-21-66
	APPD	R. Miller	2-1-66
	APPD	[illegible]	2-2-66
	FINISH	②	
	HEAT TREAT		
	SURFACE ROUGHNESS PER MIL-STD-10	✓	

CALIFORNIA COMPUTER PRODUCTS INC.
305 MULLER, ANAHEIM, CALIFORNIA

HOUSING P.C.B.
MRIR-PCM

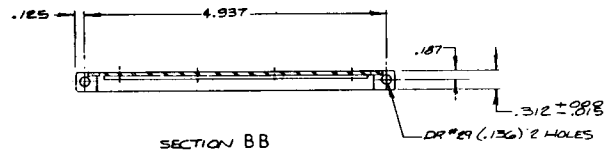
SCALE:	SIZE	
FULL	F	11413-203
DO NOT SCALE THIS DRAWING	WEIGHT	SHEET 1 OF 1

6. TAG WITH PART NO. PER CCP SPEC A0104-001
③ 5. INSTALL BEFORE APPLYING DOW# 23
4. 63/ ALL MACHINED SURFACES
② 3. DOW# 23 PER CCP SPEC A0109-005
① 2. HELI-COIL CORP, DANBURY, CONN.
1. MACHINE PER CCP SPEC A0102-001
NOTE: UNLESS OTHERWISE SPECIFIED

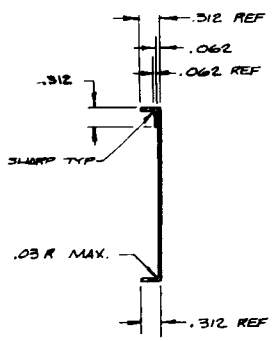
A 11413-203

FOLDOUT FRAME 2

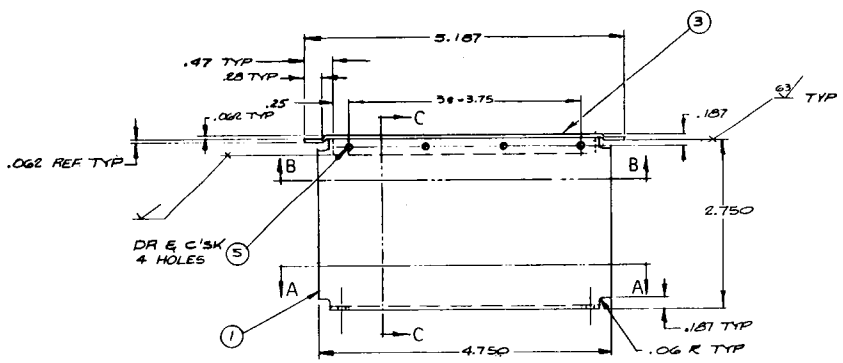
SYM	ZONE	REVISIONS DESCRIPTION	DATE & APPROVAL
A		1 MAY BE REWORKED 2 CANNOT BE REWORKED 3 NONE	
		1. ON F/D: FOR ITEM 5 DR & C'SK WAS FARSIDE EFFECT ON; NEXT PARTS MADE	S. KEY 3-24-66

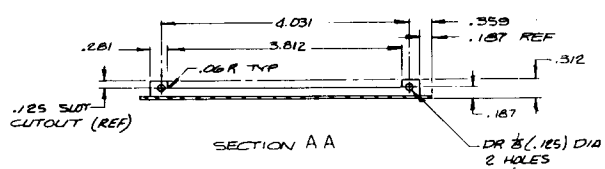


SECTION BB



SECTION CC





SECTION AA

7. IDENTIFY PER CCP SPEC A0104-001.
(2) 6. MAKE FROM PA 6530 X 5.25 6063-T5 AL ALY EXT. PIONEER ALUM, LOS ANGELES, CALIFORNIA.
5. 125 ALL MACHINE SURFACES.
4. FABRICATE PER CCP SPEC A0103-001
3. BREAK SHARP EDGES .010-.015.
(1) 2. CAUSTIC DIP.
1. MACHINE PER CCP SPEC A0102-001.
NOTE: UNLESS OTHERWISE SPECIFIED

ITEM NO	REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SIZE, DESCRIPTION & SPECIFICATION			ZONE
5	4	MS20426AD2-4	RIVET				
3	1	11414-203-5	TEE	(2)	(2)		
1	1	11414-203-3	SHIELD	.06X5.18 X4.81	5052 H32 AL ALY SHT	QQ-A-318c	
1	1	11414-203	SHIELD - PCB				

LIST OF MATERIAL OR PARTS LIST

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS XX ±.03 XXX ±.010
ANGLES ±0° 30'
DRILLED HOLES
.040 TO .128 +.002, -.001
.136 TO .228 +.003, -.001
.234 TO .500 +.004, -.001
.515 TO .750 +.005, -.001
.765 TO 1.000 +.007, -.001
1.015 TO 2.000 +.010, -.001

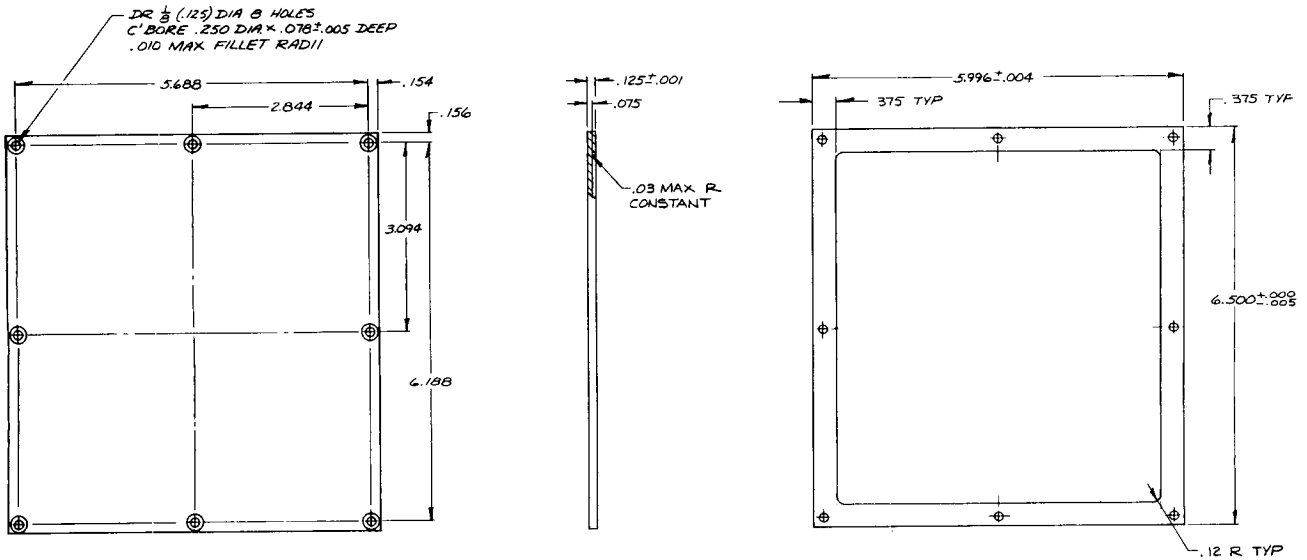
DRAWN	A.R. COLL	12-30-65
CHECK	B. Heuer	1-21-66
APPD	[signature]	2-1-66
APPD	[signature]	2-1-66
FINISH	(1)	
HEAT TREAT		
SURFACE ROUGHNESS PER MIL-STD-10	✓	

CALIFORNIA COMPUTER PRODUCTS INC.
305 MULLER, ANAHEIM, CALIFORNIA

SHIELD - P.C.B. MRIR P.C.M.

SCALE:	SIZE	
1/1	D	11414-203
DO NOT SCALE THIS DRAWING	WEIGHT	SHEET

REVISIONS				
SYM	ZONE	DESCRIPTION		DATE & APPROVAL
		(1) MAY BE REWORKED (2) CANNOT BE REWORKED (3) NONE		
A		1. G/N #2 : WAS DOW #17 PER MIL-M-45202. EFFECT ON: Pool & SUBS	1	S. KEY 9-30-66



3. TAG WITH PART NO. PER CCP SPEC A0104-001
(1) 2. DOW #23 PER CCP SPEC A0109-005
1. MACHINE PER CCP SPEC A0102-001
NOTE: UNLESS OTHERWISE SPECIFIED

REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SIZE, DESCRIPTION & SPECIFICATION	ZONE
1	11415-203	COVER.	.160 x 6.06 x 6.56 | AE91B-HZ4 MAG. ALY | QQ-M-44	

LIST OF MATERIAL OR PARTS LIST

UNLESS OTHERWISE SPECIFIED	DRAWN	D. MILLER 12-29-65
DIMENSIONS ARE IN INCHES	CHECK	E. Hennigan 1-21-66
TOLERANCES ON	APPD	2-1-66
DECIMALS .XX ± .03 .XXX ± .010 / ANGLES ± 0° 30'	APPD	2-1-66
DRILLED HOLES .040 TO .1285: +.002, -.001; .136 TO .228: +.003, -.001; .234 TO .500: +.004, -.001; .515 TO .750: +.005, -.001; .765 TO 1.000: +.007, -.001; 1.015 TO 2.000: +.010, -.001	FINISH	(1)
	HEAT TREAT	
	SURFACE ROUGHNESS PER MIL-STD-10	✓

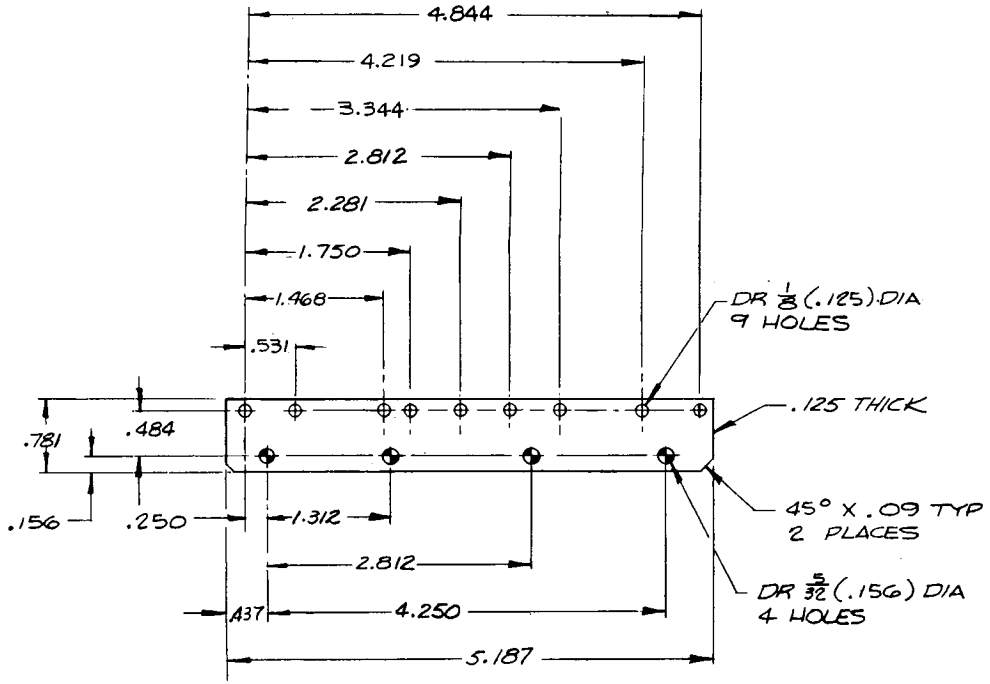
CALIFORNIA COMPUTER PRODUCTS INC.
305 MULLER, ANAHEIM, CALIFORNIA

COVER, HOUSING
MRIR-PCM

SCALE:	SIZE	
FULL	D	11415-203
DO NOT SCALE THIS DRAWING	WEIGHT	SHEET 1 OF 1

11415-203

REVISIONS			
SYM	ZONE	DESCRIPTION	DATE & APPROVAL
A		[1] MAY BE REWORKED [2] CANNOT BE REWORKED [3] NONE	S. KEY 9-30-66
		1. G/N #2: WAS DOW #17 PER MIL-M-45202. EFFECT ON: P001 & SUBS	



3. TAG WITH PART NO. PER CCP SPEC. A0104-001.
⟨1⟩ 2. DOW #23 PER CCP SPEC A0109-005
1. MACHINE PER CCP SPEC A0102-001.
NOTE: UNLESS OTHERWISE SPECIFIED

REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SIZE, DESCRIPTION & SPECIFICATION	ZONE
1	11416-203	PLATE-MTG	.125 x 3.875 x 5.250 4318-H24 MAG. ALY QQ-M-44	

LIST OF MATERIAL OR PARTS LIST

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS: XX ± .03, XXX ± .010
ANGLES: ± 0° 30'
DRILLED HOLES
.040 TO .1285: +.002, —.001
.136 TO .228: +.003, —.001
.234 TO .500: +.004, —.001
.515 TO .750: +.005, —.001
.765 TO 1.000: +.007, —.001
1.015 TO 2.000: +.010, —.001

DRAWN	A.R. COLL	12-30-65
CHECK	B Hennegan	1-21-66
APPD	[illegible]	2-1-66
APPD	[illegible]	2-1-66
FINISH	⟨1⟩	
HEAT TREAT		
SURFACE ROUGHNESS PER MIL-STD-10	✓	

CALIFORNIA COMPUTER PRODUCTS INC.
305 MULLER, ANAHEIM, CALIFORNIA

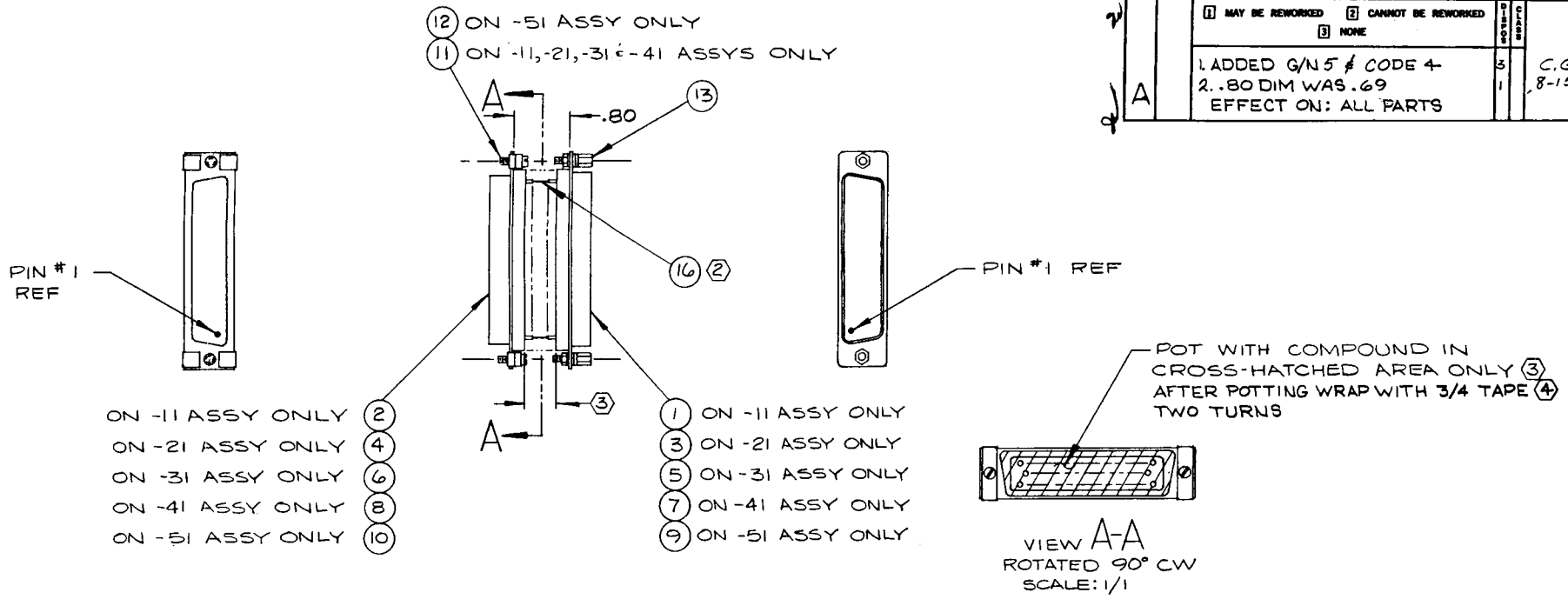
PLATE—MTG. CONN. MRIR—PCM

SCALE: 1/1
SIZE: C
11416-203
DO NOT SCALE THIS DRAWING
WEIGHT
SHEET

A | 11416-203

FORM 181 8-65

REVISIONS				
SYM	ZONE	DESCRIPTION	DISPOS	DATE & APPROVAL
		[1] MAY BE REWORKED [2] CANNOT BE REWORKED [3] NONE		
A		1. ADDED G/N 5 & CODE 4- 2. .80 DIM WAS .69 EFFECT ON: ALL PARTS	3 1	C.G 8-15-66



ITEM NO	-51 REQD ASSY	-41 REQD ASSY	-31 REQD ASSY	-21 REQD ASSY	-11 REQD ASSY	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SIZE, DESCRIPTION & SPECIFICATION			ZONE
16	1	1	1	1	1		BUS WIRE	24AWG x 18.00"			
13	2	2	2	2	2	20418-2	SCREW LK. ASSY		FEMALE	COML	
12	2					20420	SCREW LK. ASSY		MALE		
11		2	2	2	2	20419	SCREW LK. ASSY		MALE		
10	1					DDM-50S	CONNECTOR				
9	1					DDM-50P					
8		1				DCM-37S					
7		1				DCM-37P					
6			1			DBM-25S					
5			1			DBM-25P					
4				1		DAM-15S					
3				1		DAM-15P					
2					1	DEM-9S					
1					1	DEM-9P	CONNECTOR			COML	
ITEM NO	-51 REQD ASSY	-41 REQD ASSY	-31 REQD ASSY	-21 REQD ASSY	-11 REQD ASSY	11527-203	CONN-ADAPTER				

LIST OF MATERIAL OR PARTS LIST

(4) 5. TFE ELECTRICAL TAPE NO. 61, MINNESOTA MINING & MFG CO.
(3) 4. POT WITH PRO-SEAL, NO. 727 RUBBER COMPOUND, COAST PRO-SEAL & MFG. CO., LOS ANGELES, CALIF.
(2) 3. ALL PINS TO BE WIRED PIN TO PIN WITH BUS WIRE
2. TAG WITH PART NO. PER CCP SPEC A0104-001
(1) 1. ITT, CANNON ELECTRIC, LOS ANGELES, CALIF.
NOTE: UNLESS OTHERWISE SPECIFIED

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± .03, .XXX ± .010
ANGLES ± 0° 30'
DRILLED HOLES
.040 TO .1285: +.002, —.001
.136 TO .228: +.003, —.001
.234 TO .500: +.004, —.001
.515 TO .750: +.005, —.001
.765 TO 1.000: +.007, —.001
1.015 TO 2.000: +.010, —.001

DRAWN	J. JOHNSON	5-3-66
CHECK		5-13-66
APPD		5-13-66
APPD		5-20-66

FINISH
HEAT TREAT
SURFACE ROUGHNESS PER MIL-STD-10 ✓
DO NOT SCALE THIS DRAWING

CALIFORNIA COMPUTER PRODUCTS INC.
305 MULLER, ANAHEIM, CALIFORNIA

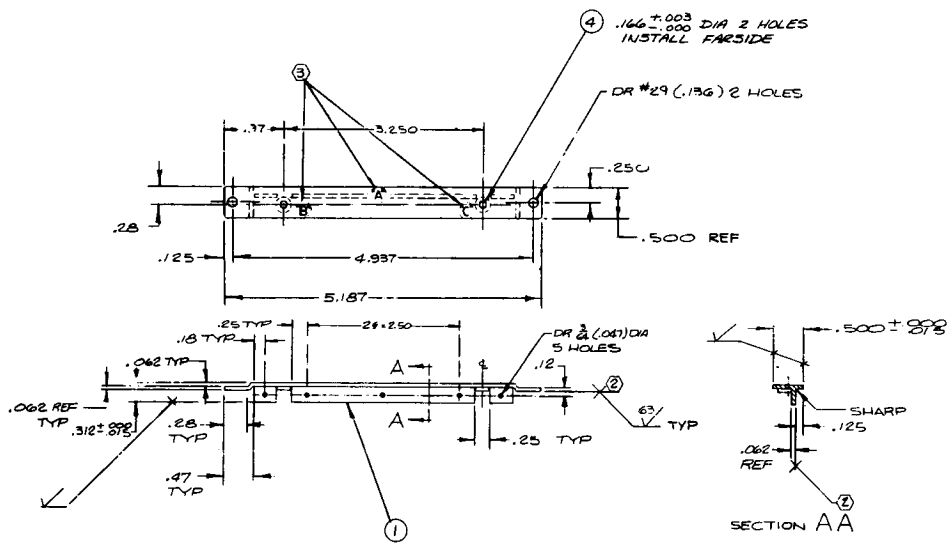
CONNECTOR-ADAPTER

SCALE: FULL
SIZE C
11527-203
WEIGHT
SHEET 1 OF 1

A | 11527-203

FORM 102 3-65

DASH NO	"A" ③	"B" ③	"C" ③
-11	ANALOG INPUTS @ 25KC	ASSY NO 10[illegible]-502	SERIAL NO ④
-21	ENCODE-TIMING	ASSY NO 10430-502	SERIAL NO ④
-31	FRAME SYNCE OUTPUT	ASSY NO 10432-502	SERIAL NO ④
-41	A/D DATA CONTROL	ASSY NO 10[illegible]-502	SERIAL NO ④
-51	A/D CONVERTER	ASSY NO 10426-502	SERIAL NO ④
-61	DC/DC CONVERTER #1	ASSY NO 10434-502	SERIAL NO ④
-71	DC/DC CONVERTER #2	ASSY NO 10436-502	SERIAL NO ④



⑥	4	2	2	2	2	2	2	2	CLS-440-2	NUT, CLINCH			COML
⑤	1	1	1	1	1	1	1	1	11606-203-1	TEE	⑤	⑥	COM'L
	ITEM NO	-71	-61	-51	-41	-31	-21	-11	11606-203	TEE, P.C.B.			
		REQD	REQD	REQD	REQD	REQD	REQD	REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SIZE, DESCRIPTION & SPECIFICATION		ZONE

LIST OF MATERIAL OR PARTS LIST

⑥ 9. PENN ENG'G & MFG CORP, DOYLESTOWN, PA.

⑤ 8. MAKE FROM PA 6530 X 5.25, 6063-T5 AL ALY EXT. PIONEER ALUM, LOS ANGELES, CALIFORNIA.

④ 7. TO BE ASSIGNED

⑤ 6. ELECTRO-ETCH DESIGNATIONS APPROX WHERE SHOWN USING .10 HIGH CHARACTERS.

5. 125 ALL MACHINE SURFACES.

② 4. NORMAL WITHIN .005 IN/IN. TYP BOTH ENDS.

3. BREAK SHARP EDGES .010-.015.

① 2. CAUSTIC DIP BEFORE ELECTRO-ETCHING.

1. MACHINE PER CCP SPEC AO 102-001.

NOTE: UNLESS OTHERWISE SPECIFIED

UNLESS OTHERWISE SPECIFIED	DRAWN	A.A. COLL	12-29-65	CALIFORNIA COMPUTER PRODUCTS INC. 305 MULLER, ANAHEIM, CALIFORNIA
DIMENSIONS ARE IN INCHES TOLERANCES ON DECIMALS .XX ± .03 .XXX ± .010 ANGLES ± 0° 30'	CHECK		12-6-66	
	APPD		12-7-66	TEE-P.C.B. ASSY
	APPD		12-30-66	
DRILLED HOLES .040 TO .128 +.002 -.001; .136 TO .228 +.003 -.001; .234 TO .500 +.004 -.001; .515 TO .750 +.005 -.001; .765 TO 1.000 +.007 -.001; 1.015 TO 2.000 +.010 -.001	FINISH ①			SCALE: + SIZE: D 11606-203
	HEAT TREAT			
SURFACE ROUGHNESS PER MIL-STD-10 ✓				DO NOT SCALE THIS DRAWING WEIGHT SHEET

REVISIONS			
SYM	ZONE	DESCRIPTION	DATE & APPROVAL
		① MAY BE REWORKED ② CANNOT BE REWORKED ③ NONE	

11606-203

APPENDIX C

MRIR-T/ME

INTERFACE INPUT/OUTPUT LISTING

APPENDIX C

MRIR-T/ME
INTERFACE INPUT/OUTPUT LISTING

C.1 INPUT CONNECTOR J1

Pin	Term	Function
1	- - -	Spare
2	-24.5 RDA	-24.5 vdc Radiometer power source from satellite regulated supply.
3	- - -	Spare
4	OFFCMDR	Off relay command return (MB)
5	OFFCMD	Off relay command (MA) -24 volt pulse, 65-millisecond duration Load: 160-ohm relay coil.
6	- - -	Spare
7	GRD S	MRIR-T/ME signal ground
8	GRD P	Primary power ground. Returned to positive terminal of the satellite regulated supply.

INPUT CONNECTOR J1 (continued)

Pin	Term	Function
9	-24.5M	Primary regulated input power to MRIR-T/ME. Load: 400 ohm ± 50 ohm with electronics on. ∞ with electronics off.
10	-24.5 TM	Primary regulated power for telemetry temperature monitoring network. Load: Nominal 14K ohm.
11	ONCMDR	Relay on command return line (MB).
12	ONCMD	Relay on command line (MA), -24 volt pulse, 65-millisecond duration. Load: 160 ohm relay coil.
13	- - -	Spare
14	GRD T	Telemetry ground
15	GRD C	Chassis ground

C.2 OUTPUT CONNECTOR J2

Pin	Term	Function
1	TRO 1	Tape recorder output No. 1 Voltage range: 6v $^{+0.5}_{-1.0}$ to 0 ± 0.6v Output impedance: 330 ohm Data rate: 1.66 kilobits/second
2	- - -	Spare
3	GRD TRO 1	Tape Recorder Output No. 1 reference ground.
4	GRD TRO 2	Tape Recorder Output No. 2 reference ground.
5	GRD P	Power ground
6	TRO 2	Tape Recorder Output No. 2 Signal characteristics same as TRO 1.
7	GRD S	Signal ground
8	GRD T	Telemetry ground
9	GRD C	Chassis ground

C.3 INPUT/OUTPUT CONNECTOR J3

Pin	Term	Function
1	-24.5 MR	-24.5 volts from primary satellite regulated supply routed through MRIR-T/ME control relay.
2	-24.5 RDA	-24.5 volts d-c radiometer power source from satellite regulated supply, routed through MRIR-T/ME unit.
3	- - -	Spare
4	CH 1	Analog Input No. 1 from radiometer electronics unit. Voltage range is 0 volts to -6.4 volts at a frequency up to 8 Hz. Input impedance is greater than 150K ohms.
5	CH 2	Analog Input No. 2 characteristics are identical to CH 1.
6	CH 3	Analog Input No. 3 characteristics are identical to CH 1.
7	GRD S	Signal ground

INPUT/OUTPUT CONNECTOR J3 (continued)

Pin	Term	Function
8	GRD P	Power ground connected to positive terminal of the satellite primary regulated supply.
9	100 ØA	Output Phase A, 100-Hz square wave is routed through the MRIR unit to the radiometer.
10	100 ØB	Output Phase B of a 2-phase, 100-Hz square wave routed through the MRIR unit to the radiometer. Phase B leads Phase A by 90^{o}.
11	- - -	Spare
12	CH 4	Analog Input No. 4 characteristics are identical to CH 1.
13	CH 5	Analog Input No. 5 characteristics are identical to CH 1.
14	GRD T	Telemetry ground
15	GRD C	Chassis ground

C.4 OUTPUT CONNECTOR J4

Pin	Term	Function
1	RLY TMP	Power Control Relay Telemetry Point Output. Voltage amplitude for ON condition is -8 ± 1.5 volts and 0 ± 0.6 volts for OFF condition. Output impedance is nominal 16.3K ohms.
2	TEM TMP	Temperature Telemetry Point Output. Voltage amplitude is variable between -3.0 volts and -6.3 volts for -10°C to +65°C. Output impedance is less than 3K ohms over the temperature range.
3	- - -	Spare
4	-18V TP	MRIR -18 volts ±3 percent regulated secondary supply. Provides 4.7K-ohm isolation resistor provided on output test point.
5	-12V TP	MRIR -12 volts ±3 percent regulated secondary supply. 4.7K-ohm isolation resistor provided on output test point.
6	-6V TP	MRIR -6 volts ±3 percent regulated secondary supply. 4.7K-ohm isolation resistor provided on output test point.

OUTPUT CONNECTOR J4 (Continued)

Pin	Term	Function
7	+6V TP	MRIR +6 volts ±3 percent regulated secondary supply. 4.7K-ohm isolation resistor provided on output test point.
8	+3.2V TP	MRIR +3.20 (+0.22V, -0.10V) regulated secondary supply. 4.7K-ohm isolation resistor provided on output test point.
9	- - -	Spare
10	RB4	208-Hz symmetrical square wave output. Amplitude is +0.2 ± 0.1 volts for the 1 state and +2.0 ±0.5 volts for the 0 state. Output impedance is greater than 4.7K ohms.
11	RB5	Pulse output that occurs every 4.8 milliseconds. Pulse duration for 1 state (+0.2 ± 0.1 volts) is 100 microseconds. For the remainder of the time, the 0 state is +2.0 ± 0.5 volts. Output impedance is greater than 4.7K ohms.

OUTPUT CONNECTOR J4 (continued)

Pin	Term	Function
12	RB1	1.66-kHz symmetrical square wave output. Amplitude for 1 state is +0.2 ± 0.1 volt and +2.0 ± 0.5 volts for the 0 state. Output impedance is greater than 4.7K ohms.
13	RN4 (ECD)	20-microsecond pulse output which repeats every 4.8 milliseconds. Output amplitude is +0.2 ± 0.1 volts for the 1 state and +2.0 ± 0.5 volts for the 0 state. Output impedance is greater than 4.7K ohms.
14	$\overline{\text{RK4}}$	25-kHz symmetrical square wave output with an amplitude of +2.0 ± 0.5 volts for the high level and +0.2 ±0.1 volt for the low level. The output impedance is greater than 4.7K ohms.
15	RC6	Pulse output that repeats 33 times per second with a pulse duration of 4.8 milliseconds. Voltage amplitude is +2.0 ± 0.5 volts for the 0 level and +0.2 ± 0.1 volts for the 1 level. The output impedance is greater than 4.7K ohms.

OUTPUT CONNECTOR J4 (continued)

Pin	Term	Function
16	RC1	Pulse output which occurs 30 milliseconds after C6 occurs. The voltage amplitude and output impedance characteristics are the same as C6 on pin 15.
17	CH5	Analog Input No. 5. This pin is provided for a protective purpose. During shipping, this point is shorted to signal ground.
18	GRD S	Signal ground.
19	GRD P	Power ground.
20	-12 TMP	MRIR -12 volt telemetry point output. Nominal voltage output is -6 volts ±4 percent. The output impedance is 2.8K ohms ±2 percent.
21	CH4	Analog Input No. 5. Same description as pin 17 on this connector.
22	$\overline{RD1}$	LSB from the A/D data register. Voltage amplitude is +2.0 ± 0.5 volts for the 0 state and +0.2 ± 0.1 volts for the 1 state. Output impedance is greater than 4.7K ohms. Digital value is 2^{0}.

OUTPUT CONNECTOR J4 (continued)

Pin	Term	Function
23	$\overline{RD2}$	2^1 Digital bit from the A/D data register. Voltage and impedance characteristics are the same as $\overline{RD1}$.
24	$\overline{RD3}$	2^2 Digital bit from the A/D data register. Voltage and impedance characteristics are the same as $\overline{RD1}$.
25	$\overline{RD4}$	2^3 Digital bit from the A/D data register. Voltage and impedance characteristics are the same as $\overline{RD1}$.
26	$\overline{RD5}$	2^4 Digital bit from the A/D data register. Voltage and impedance characteristics are the same as $\overline{RD1}$.
27	$\overline{RD6}$	2^5 Digital bit from the A/D data register. Voltage and impedance characteristics are the same as $\overline{RD1}$.
28	$\overline{RD7}$	2^6 Digital bit from the A/D data register. Voltage and impedance characteristics are the same as $\overline{RD1}$.
29	RD8	2^7 Digital bit from the A/D data register. Voltage and impedance characteristics are the same as $\overline{RD1}$.

OUTPUT CONNECTOR J4 (continued)

Pin	Term	Function
30	CH3	Analog Input No. 3. Same function as pin 17 on J4 connector.
31	COMP OT	Comparator output voltage. Output impedance is greater than 4.7K ohms.
32	V PREC	Precision voltage output, -10.0 ± 0.3 volts. Output impedance is greater than 4.7K ohms.
33	- - -	Spare
34	CH2	Analog Input No. 2. Same function as pin 17 on J4.
35	CH1	Analog Input No. 1. Same function as pin 17 on J4.
36	GRD T	Telemetry ground
37	GRD C	Chassis ground

C.5 INPUT CONNECTOR J5

Pin	Term	Function
1	10 KC CLK	10-kHz summetrical square wave. Nominal voltage swing is 0 volts to -6 volts. Nominal input impedance is 3.3K ohm.
2	- - -	Spare
3	200 KC CLK	200-kHz symmetrical square wave input. Nominal voltage swing is 0 volts to -6 volts. Nominal input impedance is 2.5K ohms.
4	GRD 200 KC	200-kHz input reference ground.
5	GRD P	Power ground.
6	100 ØA	Input Phase A, 100 Hz, square wave routed through the MRIR to the radiometer subsystem.
7	100 ØB	Input Phase B, 100 Hz, square wave routed through the MRIR to the radiometer subsystem. Phase B leads Phase A by 90°.
8	- - -	Spare
9	GRD S	Signal ground

APPENDIX D

MRIR-T/ME
CONNECTOR PIN DESIGNATION CHART

(T/M & T. P.)
J004

J107-U	RELAY T/P	1
J107-L	TEMP-TMP	2
		3
J107-07	-18.0V T.P.	4
J107-01	-12.0V T.P.	5
J107-09	-6.0V T.P.	6
J107-08	6.0V T.P.	7
J107-10	3.2V T.P.	8
		9
J104-16	RB4	10
J104-13	$\overline{RB5}$	11
J104-15	RB1	12
J104-04	RN4	13
J101-13	$\overline{RK4}$	14
J101-12	RC6	15
J101-11	RC1	16
J101-22	CH5	17
J106-V	GRD S	18
J102-05	GRD P	19
J107-02	-12.0V TMP	20
J101-21	CH4	21
J103-14	$\overline{RD1}$	22
J103-15	$\overline{RD2}$	23
J103-20	$\overline{RD3}$	24
J103-18	$\overline{RD4}$	25
J103-17	$\overline{RD5}$	26
J103-07	$\overline{RD6}$	27
J103-03	$\overline{RD7}$	28
J103-E	RD8	29
J101-20	CH3	30
J102-12	COMP OT	31
J102-22	V. PREC	32
		33
J101-04	CH2	34
J101-03	CH1	35
J102-09	GRD. T	36
CHB	GRD. C	37

(INPUT)
J001

		1
J003-2	-24.5 RDA	2
		3
J106-20	OFF CMD	4
J106-22	OFF CMDR	5
		6
J106-Y	GRD S	7
J102-06	GRD P	8
J106-17	-24.5 VM	9
J107-R	-24.5VTM	10
J106-21	ON CMD	11
J106-19	ON CMDR	12
		13
J102-10	GRD T	14
CHA	GRD C	15

ANALOG INPUTS & 25 KC GEN
J101

J005-04	200 KC GRD	1	A	GRD S	J101-17, J101-Z
J005-03	200 KC	2	B		
J004-35, J003-04	CH1	3	C		
J004-34, J003-05	CH2	4	D		
J101-L	C6	5	E		
J105-4	$\overline{C1}$	6	F		
		7	H		
		8	J		
		9	K	C1	J105-H
		10	L	C6	J101-5
J004-16	RC1	11	M	$\overline{K4}$	J104-02
J004-15	RC6	12	N	3.2V	J102-P
J004-14	$\overline{RK4}$	13	P		
		14	R		
		15	S		
		16	T		
J101-A	GRD S	17	U	K4	J004-01
		18	V	B4C	J104-18
INTERNAL TEST POINT	$\overline{C5}$	19	W	-18	J102-U
J003-06, J004-30	CH3	20	X	$\overline{K4C}$	J103-V
J003-12, J104-21	CH4	21	Y	VCHO	J102-13
J003-13, J104-17	CH5	22	Z	GRD S	J104-10, J101-A

A/D CONVERTER
J102

J103-01	$\overline{D7}$	1	A	GRD	
J103-02	D8	2	B		
INTERNAL TEST POINT	V COMP	3	C		
		4	D		
J004-19, J005-05, J001-08, J002-05, J003-08, J106-Z	GRD P	5	E		
	GRD P	6	F		-12V
	GRD P	7	H		
		8	J		
J002-08, J004-36, J001-14, J003-14, J107-04	GRD T	9	K		
	GRD T	10	L		$\overline{D5}$
	GRD T	11	M		-6V
J004-31, J103-H	COMP OT	12	N		$\overline{D6}$
J101-Y	VCHO	13	P		3.2V
		14	R		6.0V
INTERNAL TEST POINT	VREF	15	S		
J103-21	$\overline{D3}$	16	T		
J103-22	$\overline{D4}$	17	U		-18V
J103-K	$\overline{D1A}$	18	V		
		19	W		
		20	X		
J103-11	$\overline{D2}$	21	Y		
J004-32	VPREC	22	Z		GRD

FRAME SYNC & DATA OUTPUT
J105

J104-M	BIC	1	A	GRD S	J104-07, J105-Z
J104-N, J105-N	3.2V	2	B	E8	J105-03
J105-B	E8	3	C		
J101-6	$\overline{C1}$	4	D		
J103-01	$\overline{D7}$	5	E		
J002-06	TRO 2	6	F		
J103-02	D8	7	H	C1	J101-18
J103-D	$\overline{D6}$	8	J		
J002-04	GRD TRO2	9	K		
J103-19	$\overline{D5}$	10	L	-6V	J104-L, J107-11
J002-01	TRO 1	11	M		
		12	N	3.2V	J105-02, J107-M
J002-3	GRD TRO1	13	P		
		14	R	6V	J104-R, J107-13
J103-22	$\overline{D4}$	15	S		
J103-21	$\overline{D3}$	16	T		
J103-11	$\overline{D2}$	17	U		
J103-13	$\overline{D1}$	18	V		
INTERNAL TEST POINT	$\overline{F}$	19	W	A1	J104-P
J104-H	$\overline{B1}$	20	X	H	INTERNAL TEST POINT
J104-14	B1	21	Y	$\overline{B5}$	J104-17
INTERNAL TEST POINT	F	22	Z	GRD S	J105-A

J107-05

J107-15

J001-09, J003-01, J107-18

J001-12

J001-04

J001-11

J001-05

(INPUT)
J005

J104-X	10 KC	1
		2
J101-02	200 KC	3
J101-01	200 KC GRD	4
J102-05	GRD P	5
J003-09	100 Ø A	6
J003-10	100 Ø B	7
		8
J106-V	GRD S	9

(IN/OUT)
J003

J106-18	-24.5V MR	1
J001-02	-24.5V RDA	2
		3
J101-03	CH1	4
J101-04	CH2	5
J101-20	CH3	6
J106-Y	GRD S	7
J102-07	GRD P	8
J005-06	100 Ø A	9
J005-07	100 Ø B	10
		11
J101-21	CH4	12
J101-22	CH5	13
J102-10	GRD T	14
CHA	GRD C	15

(OUTPUT)
J002

J105-11	TRO1	1
		2
J105-13	GRD TRO1	3
J105-9	GRD TRO2	4
J102-06	GRD P	5
J105-06	TRO 2	6
J106-W	GRD S	7
J102-09	GRD T	8
CHB	GRD C	9

FORM 163 4-68-69

FOLDOUT FRAME

REVISIONS			
SYM	ZONE	DESCRIPTION (1 MAY BE REWORKED 2 CANNOT BE REWORKED 3 NONE)	DATE & APPROVAL
A		1. J101-5 C6 WAS SPARE J101-6 ET WAS SPACE. 2. J101-E SPARE WAS C6. J101-F SPARE WAS ET 3. J101-L TERM J101-5 WAS J101-E 4 J105-4 TERM J101-6 WAS J101-F EFFECT ON: NONE	1-17-67 DF

A/D DATA CONTROL
J103

J102-Z, J104-09		1	A	GRD S		J103-Z, J104-08
	$\overline{D7}$ (J102-01, J105-05)	2	B	S8		J103-04
	D8 (J102-02, J105-07)	3	C	3.2V		J103-05, J103-N
	J004-28 $\overline{RD7}$	4	D	$\overline{D6}$		J102-N, J105-08
	J103-B S8	5	E	RD8		J004-29
J107-B	J102-P, J103-C 3.2V	6	F	1D8		J103-J
	J004-27 $\overline{RD6}$	7	H	COMP OT		J102-12
	INTERNAL TEST POINT $\overline{S8}$	8	J	1D8		J103-F
		9	K	$\overline{D1A}$		J102-18
J103-19		10	L			
J104-L	J102-21, J105-17 $\overline{D2}$	11	M			
J103-D		12	N	3.2V		J103-C, J104-N
J101-N, J103-05	J105-18 $\overline{D1}$	13	P			
J104-R	J004-22 $\overline{RD1}$	14	R			
	J004-23 $\overline{RD2}$	15	S			
		16	T			
J101-W, J107-12	J004-26 $\overline{RD5}$	17	U	N4		J104-B
	J004-25 $\overline{RD4}$	18	V	$\overline{K4C}$		J101-X
	J102-L, J105-10 $\overline{D5}$	19	W			
	J004-24 $\overline{RD3}$	20	X			
	J102-16, J105-16 $\overline{D3}$	21	Y			
J102-A	J102-17, J105-15 $\overline{D4}$	22	Z	GRD S		J103-A

ENCODE-TIMING GEN
J104

J101 U	K4	1	A	GRD-S		J104-06
J101M	$\overline{K4}$	2	B	N4		J103-U
		3	C			
J004-13	RN4	4	D			
		5	E			
J104-A, J104-Y	GRD S	6	F			
J105-A	GRD S	7	H	$\overline{B1}$		J105-20
J103-A	GRD S	8	J			
J102-A	GRD S	9	K			
J101-Z	GRD S	10	L	-6V		J103-L, J105-L
J106-V	GRD S	11	M	B1C		J105-01
		12	N	3.2V		J103-N, J105-02
J004-11	$\overline{RB5}$	13	P	A1		J105-W
J105-21	B1	14	R	6V		J102-R, J105-R
J004-12	RB1	15	S			
J004-10	RB4	16	T			
J105-Y	$\overline{B5}$	17	U			
J101-V	B45	18	V			
		19	W			
		20	X	10KC		J005-01
		21	Y	GRD S		J104-A
		22	Z	GRD S		

DC/DC CONVERTER NO.1
J106

	1	A	GRD P		J106-Z, J107-A
	2	B			
	3	C			
	4	D			
3.2V UNREG	5	E			
	6	F	FLXO IN		J107-F
	7	H	-6V UNREG		J107-H
	8	J			
	9	K	-12V UNREG		J107-K
	10	L			
	11	M			
	12	N			
	13	P			
	14	R			
6V UNREG	15	S			
	16	T	-18V UNREG		J107-T
-24.5V M	17	U			
-24.5V MR	18	V	GRD S		J004-18, J005-09
ON CMDR	19	W	GRD S		J002-07
OFF CMD	20	X	GRD S		J104-11
ON CMD	21	Y	GRD S		J003-07, J001-07
OFF CMDR	22	Z	GRD P		J106-A, J102-07

DC/DC CONVERTER NO.2
J107

J004-05	-12V TP	1	A	GRD P		J107-Z, J106-A
J004-20	-12V TMP	2	B	-12V		J102-F
		3	C			
J102-11	GRD T	4	D			
J106-05	3.2V UNREG	5	E			
		6	F	FLXO IN		J106-F
J004-04	-18V TP	7	H	-6V UNREG		J106-H
J004-07	6V TP	8	J			
J004-06	-6V TP	9	K	-12V UNREG		J106-K
J004-08	3.2V TP	10	L	TEM TMP		J004-02
J105-L	-6V	11	M	3.2V		J105-N
J102-U	-18V	12	N			
J105-R	6V	13	P			
		14	R	-24.5V TM		J001-10
J106-15	6V UNREG	15	S			
		16	T	-18V UNREG		J106-T
		17	U	RLY TMP		J004-01
J106-18	-24.5V MR	18	V			
		19	W			
		20	X			
		21	Y			
		22	Z	GRD P		J107-A

REQD	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL SIZE, DESCRIPTION & SPECIFICATION	ZONE
1	10449-502	PIN CHART		

LIST OF MATERIAL OR PARTS LIST

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ± .03, .XXX ± .010 | ANGLES ± 0° 30'
DRILLED HOLES
.040 TO .1285: + .002, — .001
.136 TO .228: + .003, — .001
.234 TO .500: + .004, — .001
.515 TO .750: + .005, — .001
.765 TO 1.000: + .007, — .001
1.015 TO 2.000: + .010, — .001

DRAWN 8-24-66
CHECK
APPD
APPD 10-3-66
FINISH
HEAT TREAT
SURFACE ROUGHNESS PER MIL-STD-10 ✓
DO NOT SCALE THIS DRAWING

CALIFORNIA COMPUTER PRODUCTS INC.
305 MULLER, ANAHEIM, CALIFORNIA

PIN CHART - MRIR-B

SCALE: NONE | SIZE F | 10449-502 | WEIGHT | SHEET

10449-502 A

FOLDOUT FRAME 2