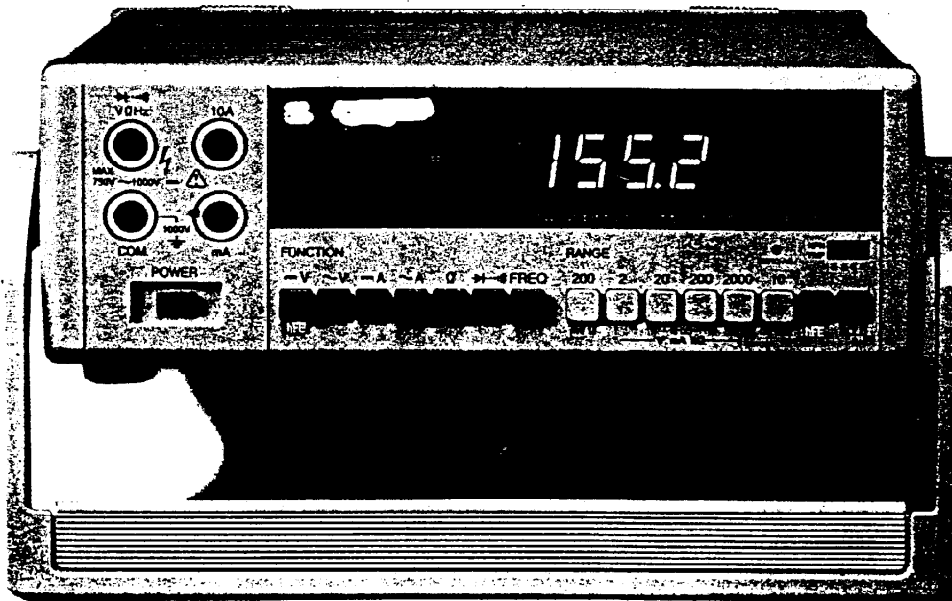


Digital Multimeter DM-441B

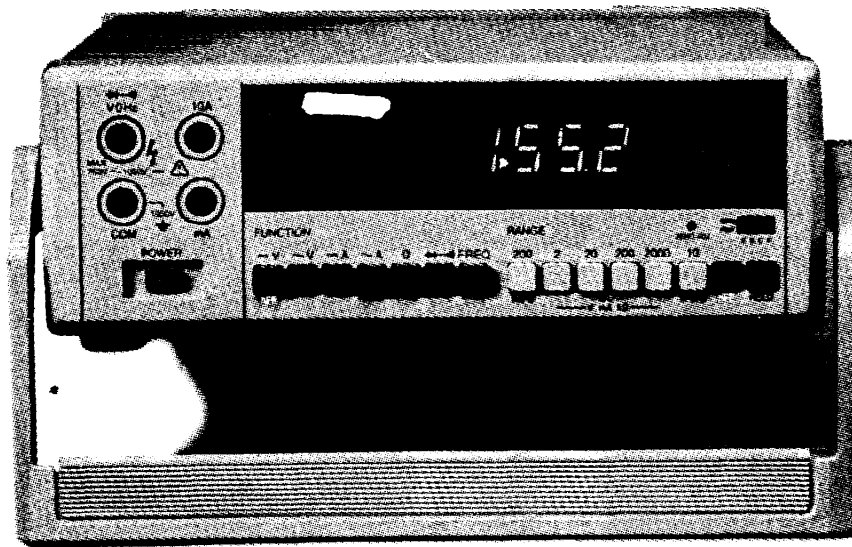
TEST AND MEASUREMENT

CUSTOMER SUPPORT



4 $\frac{1}{2}$ digit Digital Multimeter DM-441B

Service Manual



WARNING: These servicing instruction are for use by qualified personnel only. To avoid electric shock do not perform any servicing other than that contained in the Operating Instructions unless you are fully qualified. to do so

Impor tant

In correspondence concerning this instrument, please quote the type number and serial number, as given on the type plate

Note:

The design of this instrument is subject to continuous development and improvement.

Consequently, this instrument may incorporate minor changes in detail from the information contained in this manual

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1. Introduction

1-1. INTRODUCTION

Model DM-4419 is a portable **bench** type digital multimeter (DMM) with a **4-1/2** digit light emitter diode(LED). The DM-4419 has all the following industry-Standard features:

- ⊙ **Voltage** measurements from **10 μ V** to **1000V** dc and **10mV** to **750V** true-rms ac.
- ⊙ Current measurements from **100nA** to **10A** dc and **1mA** to **10A** true-rms ac
- ⊙ Resistance measurements from **10m Ω** to **20M Ω**
- ⊙ **Automatic** polarity indication and over range indication
- ⊙ **Protection** from over **loads** and **protection** from transients of up to **600V**
- ⊙ Dual-slop integration A-D **conversion** to ensure noise-free measurements.
- ⊙ Long term calibration stability(**1year**)
- ⊙ Safety and EMC : Approval at TUV

This **meter** has been designed and tested in accordance with safety and EMC.

- SAFETY : **EN61010-1** Approval at TUV
- EMC REGULATIONS : **EN50081-1**, EN55022, class B
EN50082-1, IEC801-2,3,4
- **OVERVOLTAGE** CAT. II
- POLLUTION DEG. II

1-2. The DM-4419 is warranted for a period of one year upon shipment of the instrument to the original **purchaser**. Conditions of the warranty are given at the front of this manual. The DM-4419 is typically powered from ac line voltage.

I-3. ACCESSORIES

The **use** of the DM-4419 **can** be enhanced by the accessories available for this instrument.

The accessories listed

- Test leads : 1set
- Power **cord**; 1pc
- Operating manual : **1copy**
- Fuse : 1pc

2. SPECIFICATIONS

2-1. ELECTRICAL

The electrical specifications given apply for an Operation temperature of 18°C to 28 ° C (64.4°F to 82.4°F), relative humidity up to 80%, and a 1-year calibration cycle

2-2.Function

DC volts, AC volts, DC current, AC current, Resistance, Frequency Diode test, hFE Continuity test,

2-3. DC Voltage

RANGE	RESOLUTION	ACCURACY
200mV	10µV	±(0.05% of reading +4 digit)
2V	100µV	
20V	1mV	
200V	10mV	
1 000V	100mV	±(0.15% of reading +4 digit)

- ⊙ INPUT IMPEDANCE ----- 10MΩ in parallel with <100pF all range
- ⊙ NORMAL MODE REJECTION RATIO ----- >60dB at 60Hz or 50Hz
- ⊙ COMMON MODE REJECTION RATIO ----- >90dB at dc, 50Hz or 60Hz
- ⊙ COMMON MODE VOLTAGE(MAXIMUM) ----- 1000V dc or peak ac
- ⊙ RESPONSE TIME TO ----- 2.5/second maximum
- ⊙ MAXIMUM INPUT ----- 1000V dc or peak ac continuous
(less than 10 second duration both the 200mV and 2V ranges)

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2-4. AC Voltage(True RMS)

RANGE	RESOLUTION	ACCURACY
200mV	10 μ V	$\pm(0.5\%+20\text{DIGIT})$, (45Hz ~ 1kHz) $\pm(0.8\%+10\text{DIGIT})$, (1kHz ~ 10kHz) $\pm(1.0\%+20\text{DIGIT})$, (10kHz ~ 20kHz) $\pm(3.0\%+30\text{DIGIT})$, (20kHz ~ 50kHz)
2V	100 μ V	$\pm(0.5\%+20\text{DIGIT})$, (45Hz ~ 300Hz) $\pm(0.8\%+10\text{DIGIT})$, (300Hz ~ 10kHz) $\pm(1.0\%+20\text{DIGIT})$, (10kHz ~ 20kHz) $\pm(3.0\%+30\text{DIGIT})$, (20kHz ~ 50kHz)
20V 200V	1mV 10mV	$\pm(0.5\%+10\text{DIGIT})$, (45Hz ~ 300Hz) $\pm(0.8\%+10\text{DIGIT})$, (300Hz ~ 10kHz) $\pm(1.0\%+20\text{DIGIT})$, (10kHz ~ 20kHz) $\pm(3.0\%+30\text{DIGIT})$, (20kHz ~ 50kHz)
750V	100mV	$\pm(0.5\%+10\text{DIGIT})$, (45Hz ~ 1kHz)

- @INPUT IMPEDANCE ----- 10M Ω in parallel with <100pF all range
- ⊙ COMMON MODE REJECTION RATIO ----- >60dB at dc, 50Hz or 60Hz
- ⊙ RESPONSE TIME TO ----- 2.5/second maximum
- ⊙ MAXIMUM INPUT ----- 750V rms or 1000V peak continuous
 (less than 10 second duration both the 200mV and 2V ranges)
- ⊙ CREST FACTOR RANGE ----- Waveform with a Peak/RMS ratio of 1:1
 to 3:1 at fullscale, increasing down range

2-5. DC Current

RANGE	RESOLUTION	ACCURACY
200mA	0.1 μ A	$\pm(0.5\%+1\text{DIGIT})$
2mA	1 μ A	
20mA	10 μ A	
200A	100 μ A	
10A	10mA	$\pm(0.75\%+3\text{DIGIT})$

- ⊙ OVERLOAD PROTECTION(ac/dc) ----- mA INPUT :built-in 2A/250V fuse
 10A INPUT :built-in 10A/250V fuse

2-6. AC Current (True RMS)

RANGE	RESOLUTION	ACCURACY
2mA 20mA 200mA	0.1μA 1μA 10μA	±(1.0%+10DIGIT), (45Hz~10kHz) ±(2.0%+20DIGIT), (10kHz~20kHz)
2A 10A	100μA 10mA	±(1.0%+10DIGIT), (45Hz~2kHz)

- ⊙ OVERLOAD PROTECTION(ac/dc) ----- mA INPUT :built-in 2A/250V fuse
10A INPUT :built-in 10A/250V fuse
- ⊙ CREST FACTOR RANGE ----- Waveform with a Peak/RMS ratio of 1:1 to 3:1 at full scale

2-7. Resistance

RANGE	RESOLUTION	ACCURACY
20051	10mΩ	±(2.0%+5DIGIT)
2K 20kΩ 200kΩ	0.152 1Ω 10Ω	±(2.0%+2DIGIT)
2MΩ 20MΩ	100Ω 1kΩ	±(0.5%+2DIGIT)

- ⊙ OVERLOAD PROTECTION ----- 600V dc/ac rms in all range(1minute)

2-8. Frequency

RANGE	RESOLUTION	ACCURACY
20kHz	1Hz	±(1.0%+3DIGIT)
200kHz	10Hz	±(2.0%+3DIGIT)

- ⊙ INPUT SENSITIVITY --- ----- 100mV rms(min)
- ⊙ OVERLOAD PROTECTION ----- 250V dc/ac rms

2-9. DIODE TEST

- ⊙ TEST VOLTAGE ----- Approx 4.5V
- ⊙ TEST CURRENT ----- Approx 1mA
- ⊙ OVERLOAD PROTECTION ----- 600V dc/ac rms all range(1minute)

2-10. CONTINUITY TEST

- ⊙ THRESHOLD - ----- 200Ω or Less
- ⊙ OVERLOAD PROTECTION ----- 600V dc/ac rms all range(1minute)

2-11. hFE measurements

- ⊙ BASE CURRENT ----- Appr ox 3.5 μ A
- ⊙ COLLECTOR TO EMITTER VOLTAGE ----- Approx 4.5V

2-12. ENVIRONMENTAL

2-12-1. Temperature Coefficient

< 0.1 times the **applicable accuracy specification per °C** for 0°C to 18°C and 28°C to 50°C (32°F to 64.4°F and 82.4°F to 122°F)

2-12-2. Operating Temperature ----- 0°C to 50°C (32°F to 122°F)

2-12-3. Storage Temperature ----- -20°C to 60°C (-4°F to 140°F)

2-12-4. Accuracy Guarantee ----- 18°C to 28°C (64.4°F to 82.4°F)

2-12-5. Relative Humidity

Below 80% **under** the use temperature of 0°C to 50°C (32°F to 122°F)

Below 70% **under** the storage temperature of -20°C to 60°C (-4°F to 140°F)

Below 80% **under** the accuracy guarantee of 18°C to 28°C (64.4°F to 82.4°F)

2-13. General Information

2-13-1. Maximum Common Mode Voltage ----- 1 000V dc or rms ac
(low terminal potential with respect to power line ground)

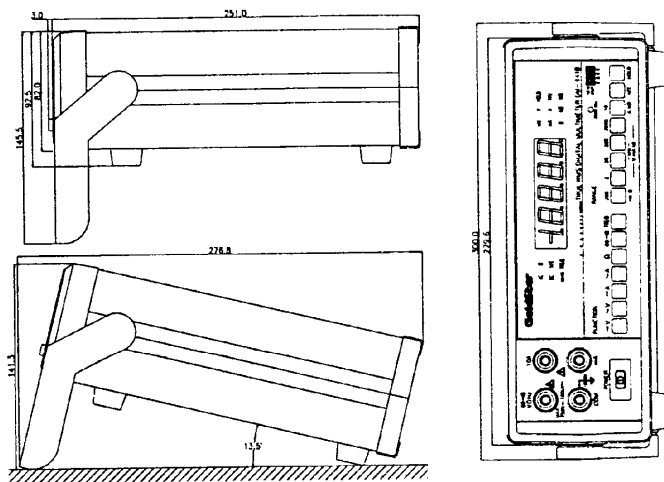
2-13-2. Dimensions ----- 25.0cm X 9.25cm X 25.1cm

2-13-3. Weight ----- 1.50kg

2-14. Power Requirements

2-14-1. LINE VOLTAGE ----- 103 to 126V ac 50 to 60 Hz
206 to 252V ac 50 to 60 Hz

2-14-2. POWER CONSUMPTION ----- 10Wmax



DM-4419 Dimensions

3. PREVENTIVE MAINTENANCE

Preventive maintenance, when performed on a regular basis, can prevent instrument breakdown and may improve the reliability of the digitalmultimeter. The severity of environment to which this instrument is subject will determine the frequency of maintenance. A convenient time to perform preventive maintenance is preceding recalibration of the instrument.

3-1. Disassembly

Remove the top cover and the bottom cover of the instrument. Most of the internal parts of the instrument are now accessible, if access to the front of the circuit board are necessary.

3-2. Cleaning

The instrument should be cleaned as often as operating conditions require. Accumulation of dirt in the instrument can cause component breakdown.

The covers provide protection against dust in the interior of the instrument. Loose dust accumulated on these covers can be removed with a soft cloth or small brush.

Dirt that remains can be removed with a soft cloth dampened in a mild detergent and water solution. Abrasive cleaners should not be used.

Cleaning the interior should only be occasionally necessary. The best way to clean the interior is to blow off the dust with a drier, lowvelocity stream of air. A soft-bristle brush or a cotton tipped applicator is useful for cleaning in narrow spaces or for cleaning more delicate components.

3-3. Visual Inspection

The instrument should be inspected occasionally for such defects as broken connections, improperly seated transistors, damaged circuit boards, and heat-damaged parts. The corrective procedure for most visible defects is apparent ; however, particular care must be taken if heat-damaged components are found. Overheating usually indicates other trouble in the instrument ; therefore, correcting the cause of the overheating is important to prevent recurrence of the damage

4. CIRCUIT DESCRIPTION

4-1. ANALOG TO DIGITAL CONVERSION

When all I values to be measured are connected to R72, they are applied to UIO-8 and the LED driver signal of UIO-26, 25, 20, 19, 14, 29 and the BCD signal of UIO-15, 16, 17, 18 are output by integral constant of R69, R70, C32, C33 and the value is displayed on LED with UI3 BCD to 7-segment decoder. (See. P32 51 1-577-A1/3)

4-2. SYSTEM REFERENCE

The reference of the value(1.0000V) to be measured is applied to U10-40 at VR15. (See. P32 511-577-A 1/3)

4-3. SYSTEM FREQUENCY

The 10MHz square wave generated at Y1(crystal) is attenuated to 100KHz by U11, U12 decade counter and applied to UIO-28.
(See. P32 51 1-577-A1/3)

4-4. POWER CIRCUIT

AC power supply is used as input power, and the applied AC voltage is applied to each regulator IC passing 2 rectifier circuits at the 2nd side of the transformer. (See. P33 51 1-577-A 2/3)

4-4-1. +5V CIRCUIT

As the voltage rectified through D15, D16, D17, D18 rectifier diode at the 2nd side of the transformer is applied to regulator IC 1 attached to the real panel, +5V is output to regulator IC 3 and applied through R82 to a circuit that needs +5V.

4-4-2. -5V CIRCUIT

Output of +5V is converted to -5V by being applied to DC-DC converter U19-8, and -5V is applied to the circuit that needs.

4-4-3. +15V CIRCUIT

Of the voltages rectified through **D19, D20, D21, D22** rectifier diode at the 2nd side of the transformer, cathode of **D20** and **D21** is applied to **U15-1**, and at this time **+15V** is output to 3 and applied through **D23** to the circuit that needs **+15V**.

4-4-4. -15V CIRCUIT

Of the voltages rectified through **D19, D20, D21, D22** rectifier diode at the 2nd side of the transformer, anode of **D19** and **D22** is applied to **U16-2**, and at this time **-15V** is output to 3 and applied through **D24** to the circuit that needs **-15V**.

4-4-5. FREQUENCY POWER (+5V) CIRCUIT

J14T and **J14** are used as power supply for frequency measuring circuit by outputting power supply of **+5V** to 3 by applying output of **+5V** of **D23** cathode to **U20-1**

4-5. IO-TIME AMPLIFYING CIRCUIT

All signals can be applied in DC voltage to **R72** that is input of A-D convertor, only through the IO-time circuit by using op-amp of **UI**. The IO-time circuit is operated by combining **RE1, R10A, VR5** with function or the range switch, and the Operation of the IO-time circuit is corresponding to DC voltage **200mV, 20V** resistance **200Ω, 200kΩ** and all remaining functions.

The principle of Operation is that when the switch corresponding to the condition mentioned above is selected after power is supplied, **RE1-6** and **D5-anode** is linked to GND and **UI AMP** circuit is amplified 10 times by **R10A** array resistance. (See. P32 51 1-577-A 1/3)

4-6. DC VOLTAGE MEASURING CIRCUIT

DC voltage circuit is attenuated as much as **1/1, 1/100, 1/1000** by **R1, R2, VR3, R5, VR4, R6** and linked to **R72** through the IO-time amplifying circuit. (See. P32 51 1-577-A 1/3)

4-7. AC VOLTAGE MEASURING CIRCUIT

This is same as the attenuator DC voltage circuit of the AC voltage circuit, and the attenuated signal is applied to C12 through the IO-time amplifying circuit and then connected to R72 after being converted to DC at U2 rms IC.

4-8. DC CURRENT MEASURING CIRCUIT

4-8-1. 2mA, 20mA, 200mA Measuring Circuit

The current applied to the input is connected to R72 through the IO-time amplifying circuit that meets with attenuator resistance at R32, R34, R37. (See. P32 51 1-577-A1/3)

4-8-2. 2000mA Measuring Circuit

The current applied to the input is connected to R72 through the IO-time amplifying circuit that meets with R5 at the input board. At this time, the relay in the input board starts working, but UI-3, UI-2 at the front board turn to the low state, while U3-1 is put in the high state and connects the front board P6 and the input board J1 with wire.

When the U3-1 signal is connected to the base of Q1 after passing input board R2 and sets Q1 in motion, the relay starts working and connects the current input terminal to R5.

(See. P32 51 1-577-A1/3 , P35 511-578-A and P36 511-579-A)

4-8-3. 10A Measuring Circuit

The current applied to the input is connected to R72 through the IO-time amplifying circuit that meets with RIO0 Mn resistance at the input board. (See. P32 51 1-577-A1/3 and P36 511-579-A)

4-9. AC CURRENT MEASURING CIRCUIT

The AC current measuring circuit keeps its state until the output of the IO-time amplifying circuit and then becomes equal to the AC voltage circuit. The AC current signal is amplified 10 times when applied to C12 after passing the IO-time amplifying circuit and then linked to R72 as it is converted to DC from U2 true rms. (See. P32 511-577-A1/3)

4-10. RESISTOR MEASURING CIRCUIT

The resistor measuring circuit can measure 200Ω and $2k\Omega$ by R4, VR1, $20k\Omega$ by R4, VR1, R3, VR2, and $200k\Omega$, $2M\Omega$ and $20M\Omega$ by R4, VR1, R3, VR2, R2, R1. Measurement is performed in the following way: the source voltage of the measuring circuit is supplied to A marked on the circuit diagram by U5 output, and DC voltage appearing in Proportion between resistance to be measured and each attenuator resistance is connected to R72 after passing the IO-time amplifying circuit.
(See. P32 51 1-577-A1/3)

4-11. DIODE AND CONTINUITY MEASURING CIRCUIT

4-11-1. Diode Measuring Circuit

When diode is connected in the forward direction to the input, the forward voltage is applied between R18 and R19 by the voltage from R17 and the attenuated voltage by R19, R22 is linked to R72 through the IO-time amplifying circuit after passing R24.
(See. P32 51 1-577-A1/3)

4-11-2. Continuity Measuring Circuit

The continuity measuring circuit sets the reference voltage at U3-3 by R20, R21, R23. When resistance is connected to the input, the voltage is applied between R18 and R19 by the voltage from R17. The attenuated voltage by R19 and R22 is linked to U3-2 through R24 and connected to R72 through the IO-time amplifying circuit.

At this time, if the U3-2 voltage is lower than the reference voltage of U3-3, U3-1 turns to the high state and puts U4-1 in the high state through R26, the input of the buzzer circuit, and then sets the buzzer in motion by operating U4 oscillation circuit.
(See. P32 511-577-A1/3)

4-12. FREQUENCY MEASURING CIRCUIT

When the frequency described in the specifications is input by using the frequency generator, the frequency is applied to U7-3 through R52, C25. At this time, if the signal of frequency is higher than that of U7-2, the signal of U7-1 turns to the high state and becomes the trigger signal of U8-2 by being differentiated by C26, R55. When the trigger signal is applied to U8-2, U8 monostable multivibrator with U8-3 output generates the Square-wave of 20kHz with time constant of R59, C27 and 200 kHz with time constant of R58, C27.

The generated Square-wave 20 kHz and 200 kHz through the analog switch of U9-12 and U9-13, respectively, and the attenuated signal by VR14, R85 through the IO-time amplifying circuit are connected to R72.
(See. P32 51 1-577-A1/3)

4-13. hFE MEASURING CIRCUIT

When the collector-current amplification factor, hFE, is inserted into the front panel hFE socket according to the transistor type (NPN or PNP) and the pin type, it is connected to R97, R98 and R99 of the main board and becomes the self bias circuit. TR turns on and the collector current flows. At this time, the voltage dropped by R97 is connected to R72 through the IO-time amplifying circuit.
(See. P33 51 1-577-A2/3)

4-14. FRONT PANEL FUNCTION AND RANGE DISPLAYING LED DRIVER CIRCUIT

The signal of the driver circuit of LED displaying the front panel range is made by combination of function and range switch selection and U17, U18 IC. Function LED signal is made by combination of R96 and the function switch. (See. P33 51 1-577-A2/3)

4-15. HOLD CIRCUIT

If the HOLD switch on the front panel is pressed, the value on display is held by connecting UIO-31 to GND. At this time, the over-range value does not appear. In addition, the hold LED on the front panel is displayed when supplied with power through R33.
(See. P32 51 1-577-A1/3 and P33 51 1-577-A2/3)

5. CALIBRATION

provides **complete** instrument repair and calibration at our oversea's **office** and authorized **dealer**.

5-1. CALIBRATION INTERVAL

To maintain instrument accuracy, **perform** the calibration of the DM-441B unit at least every one year if used frequently.

5-2. PRELIMINARY PROCEDURE

This instrument should be calibrated at an ambient temperature 18°C to 28°C with relative humidity up to 80% for best Overall

- 5-2-1. Set the instrument controls as given in the preliminary control setting. Calibration must be performed after warmup time of at least 15 minutes after **power** is supplied.
- 5-2-2. The part should be calibrated with calibration VR marked in the electrical part arrangement.

5-3. Initial Starting Procedure

Before starting calibration, the following order must be kept:

- 5-3-1. Remove the power **cord** and the test lead and open the **cover** by loosening 4 screws fastening the **bottom cover**.
- 5-3-2. Check **2A/250V** and **10A/250V** fuse at the input board and the fuse at the real **plate**.
- 5-3-3. Turn on the power by pushing the power **switch**.

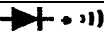
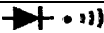
5-4. TEST EQUIPMENT

- 5-4-1. DMM calibrator (Fluke **5101B, 5220A** or equal equipment) ----- 1 set
- 5-4-2. **Dacade resistor** (General radio **1433-H** or DMM calibrator) ----- 1 set
- 5-4-3. Signal **generator** (HP 3325B or equal equipment) ----- 1 set

5-5. CALIBRATION AND THE TEST PROCEDURE

5-5-1. Check-Up of Functions

Check the LED display as shown in the following table **by** choosing the functionalS/W to DMM to be measured.

FUNCTION	FUNCTION LED	RANGE LED
= V	DC	mV . V
~V	AC	mV . V
= A	DC	mA . A
~A	AC	mA . A
Ω	Ω	Ω . k Ω . M Ω
		
FREQ	FREQ	KHz
hFE	hFE	

5-5-2. Check-Up Test of the LED Display

Choose the resistance range and make the input short to confirm the LED display as shown in the following table.

LED Choices	LED Display
200 Ω	00.00'
2 k Ω	.0000'
20 k Ω	0.000
200 k Ω	00.00
2000 k Ω	000.0
20 M Ω	0.000

Note : ' can be changed between 0-numeral digit by the test lead resistance.

5-5-3. DC Voltage Calibration

- 1) Choose DC V for the function switch and connect RED READ to the INPUT terminal and BLK READ to the Common terminal.
- 2) Calibrate the LED display at 00.00 with VR6(①) by choosing the 200mV RANGE and making the input short.
- 3) Calibrate VR15(②) till 1.9000V is displayed on LED by choosing the 2V RANGE and applying DC 1.9V to the input.

- 4) Calibrate VR3(③) till 190.00V is displayed on LED by choosing the 200V RANGE and applying DC 190V to the input.
- 5) Calibrate VR4(④) till 1000 V is displayed on LED by choosing the 1000V RANGE and applying DC 1000V to the input.
- 6) Calibrate VR5(⑤) till 190.00mV is displayed on LED by choosing the 200mV RANGE and applying DC 190mV to the input.

5-5-4. AC VOLTAGE CALIBRATION

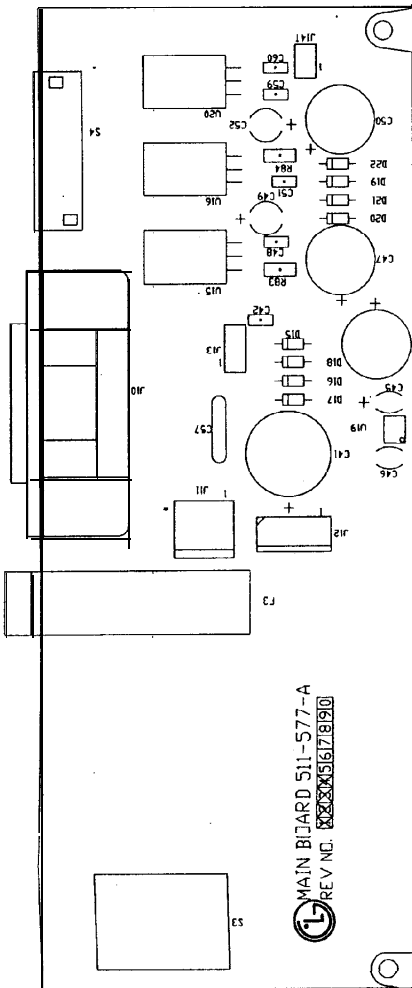
- 1) Choose AC V for the function switch and link RED READ to the input terminal and BLK READ to the common terminal.
- 2) Calibrate the LED display at .0000 with VR9(⑥) by choosing the 2V RANGE and making the input short.
- 3) Calibrate VR8(⑦) till 1.9000V is displayed on LED by choosing the 2V RANGE and applying AC 1.9V/60Hz to the input.
- 4) Calibrate VC2(⑨) till 190.00mV is displayed on LED by choosing the 200mV RANGE and applying AC 190mV/50kHz to the input.
- 5) Calibrate VC1(⑧) till 19.000V is displayed on LED by choosing the 20V RANGE and applying AC 19V/10kHz to the input.

5-5-5. Resistance Calibration

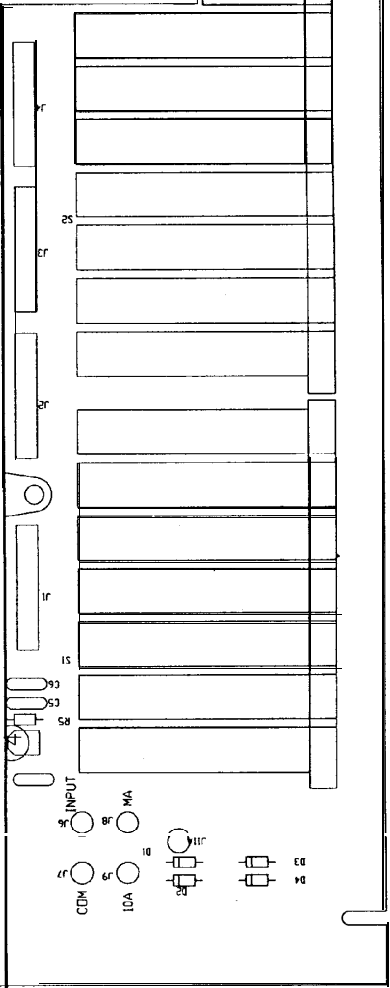
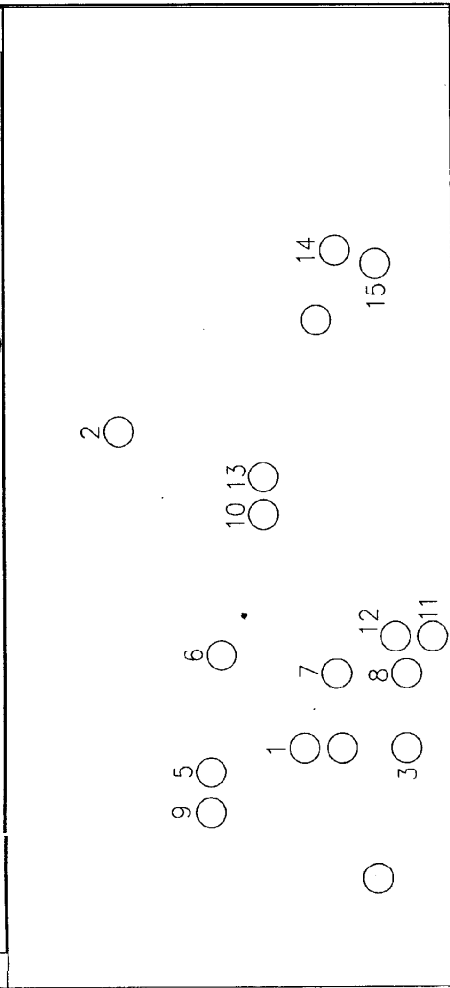
- 1) Choose resistance for the function switch and link RED READ to the input terminal and BLK READ to the common terminal.
- 2) Calibrate the LED display at 100.00k Ω with VR10(⑩) by choosing the 200k Ω RANGE and applying 100k Ω to the input.
- 3) Calibrate VR2(⑪) till 10.000k Ω is displayed on LED by choosing the 20k Ω RANGE and applying 10k Ω to the input.
- 4) Calibrate VR1(⑫) till 1.0000k Ω is displayed on LED by choosing the 2k Ω RANGE and applying 1k Ω to the input.
- 5) Calibrate VR11(⑬) till 10,000M Ω is displayed on LED by choosing the 20M Ω RANGE and applying 10M Ω to the input.
 Note: When calibrating 10M Ω , a short PROBE or STANDARD resistance must be used to reduce effects caused by the PROBE.

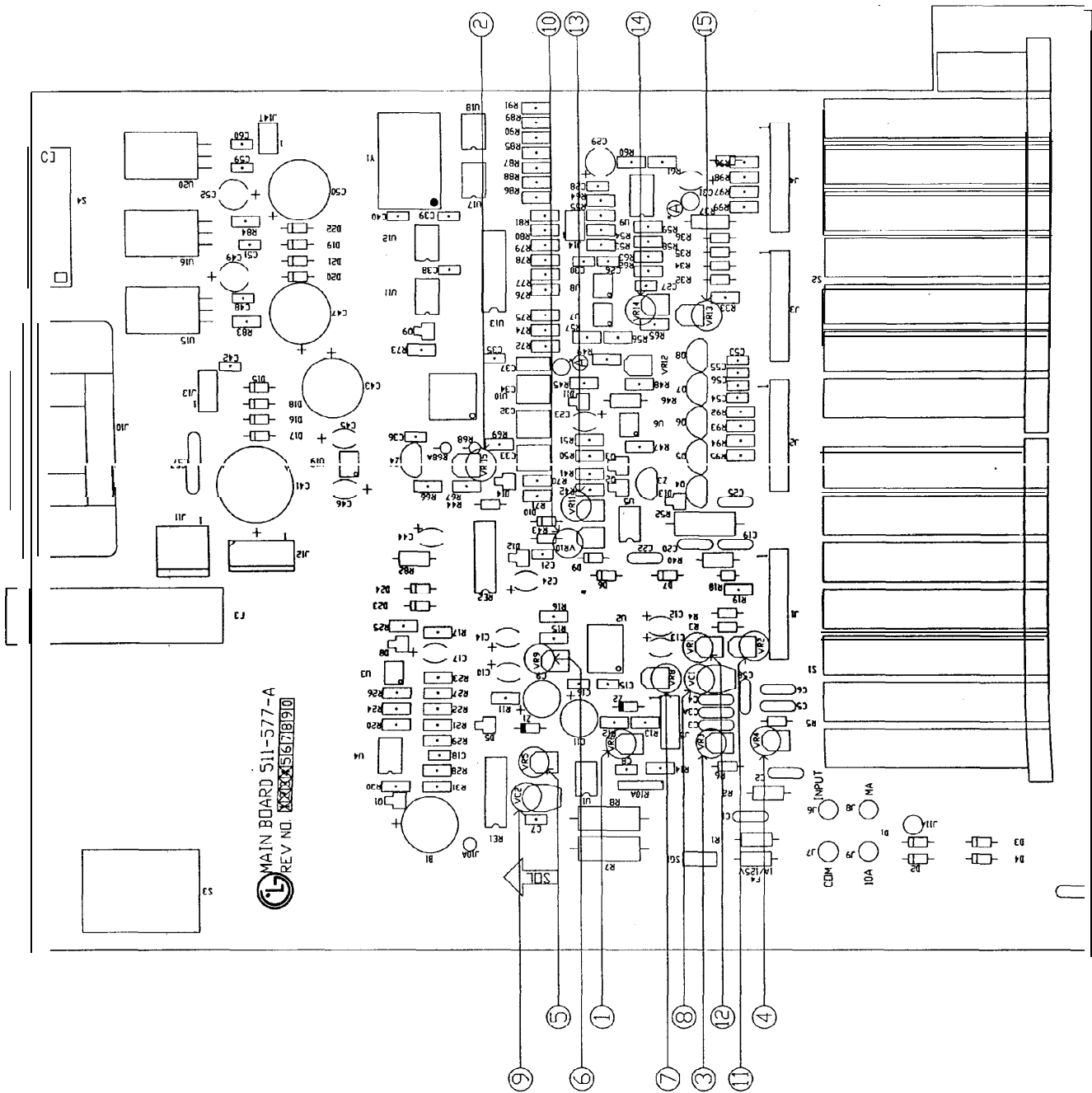
5-5-8. FREQUENCY CALIBRATION

- 1) Choose frequency for the function switch and link RED READ to the input terminal and BLK READ to the common terminal.
- 2) Calibrate the LED display at 19.000kHz with VR14(⑭) by choosing the 20kHz RANGE and applying 19kHz/100mV to the input.
- 3) Calibrate VR13(⑮) till 150.00kHz is displayed on LED by choosing the 20kHz RANGE and applying 150kHz/100mV to the input.

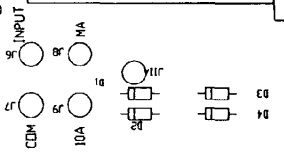


MAIN BOARD 511-577-A
 REV. NO. 51517820






MAIN BOARD 511-577-A
 REV NO. ~~XXXX567890~~



7. PARTS LIST

7-1. ELECTRICAL PARTS LIST

7-1-I. MAIN BOARD ASS'Y(511-577-A)

ITEM NO	DESCRIPTION	FIND NO	QTY	UNIT
219-202	SHIELD COVER-B DM441B		1.00	EA
513-577R5	DM441B MAIN B/D REV.5		1.00	EA
550-801-A	W/H1PIN BLK INPUT	A	1.00	EA
637-013	BUZER SBT-11P	BI	1.00	EA
CK2HL040C	CER 4PF 100V C BLK	C01	1.00	EA
CK2HL040C	CER 4PF 100V C BLK	C02	1.00	EA
CK1HR181J	CER 50V 180pF J T.P	C03	1.00	EA
CK1HR331J	CER 330PF 50V J T.P	C04	1.00	EA
CK1HR182K	CER 3300pF 50V K T.P	C05	1.00	EA
CK1HR182K	CER 3300pF 50V K T.P	C06	1.00	EA
CKIH110IJ	CHIP 50V J 100pF(2012)	C07	1.00	EA
CK1HI100K	CHIP CAP 10 PF 50V D(2012)	C08	1.00	EA
CE1EL107K	ELEC SR TYPE 100UF 25V	C09	1.00	EA
581-176	ELEC 10uF 16V SRE-TYPE	C10	1.00	EA
CE1EL107K	ELEC SR TYPE 100UF 25V	C11	1.00	EA
CSIELIOGK	TANTAL 10UF 35V CAP	C12	1.00	EA
CSIELIOGK	TANTAL 10UF 35V CAP	C13	1.00	EA
CS1VL105K	TANTAL 1uF 35V	C14	1.00	EA
CK1HI104M	CHIP 0.1UF 50V(2012)+-20%	C15	1.00	EA
CK1HI104M	CHIP 0.1UF 50V(2012)+-20%	C16	1.00	EA
CE1EL476R	ELEC 47UF 16V SRE-TYPE	C17	1.00	EA
CK1HI221J	CHIP 50V J 220pF(2012)	C18	1.00	EA
CK3DL101K	CER 100PF 2KV K BLK	C19	1.00	EA
CK3AL102K	CERAMIC 1000pF 1KV	C20	1.00	EA
CKIH110IJ	CHIP 50V J 100pF(2012)	C21	1.00	EA
CK3AL102K	CERAMIC 1000pF 1KV	c22	1.00	EA
581-162	ELEC 1uF 50V SRE-TYPE	C23	1.00	EA
581-176	ELEC 10uF 16V SRE-TYPE	C24	1.00	EA
CK3AL102K	CERAMIC 1000pF 1KV	C25	1.00	EA
CK1HI680J	CHIP 68pF 50V J (SMD)	C26	1.00	EA
CK1HI680J	CHIP 68pF 50V J (SMD)	C27	1.00	EA
CK1HI104M	CHIP 0.1UF 50V(2012)+-20%	C28	1.00	EA
CE1EL476R	ELEC 47UF 16V SRE-TYPE	c29	1.00	EA
CK1HI120J	CHIP 50V J 12 PF (2012)	C30	1.00	EA
581-162	ELEC 1uF 50V SRE-TYPE	C31	1.00	EA
581-226	MP 1uF 63V J MMY168	C32	1.00	EA
581-227	MP 0.47uF 63V J MMY168	c33	1.00	EA
581-226	MP 1uF 63V J MMY168	c34	1.00	EA
CK1HI104M	CHIP 0.1UF 50V(2012)+-20%	c35	1.00	EA
CK1HI104M	CHIP 0.1UF 50V(2012)+-20%	C36	1.00	EA
581-195	0.1uF MP63V J MMY168	c37	1.00	EA

ITEM NO	DESCRIPTION	FIND NO	QTY	UNIT
CK1HI104M	CHIP 0.1UF 50V(2012)+-20%	C38	1.00	EA
CK1HI104M	CHIP 0.1UF 50V(2012)+-20%	c39	1.00	EA
CK1HI104M	CHIP 0.1UF 50V(2012)+-20%	C40	1.00	EA
CE1EL228R	ELEC 2200UF 25V SMS BLK	c41	1.00	EA
CK1HI104M	CHIP 0.1UF 50V(2012)+-20%	C42	1.00	EA
CE1EL477R	ELEC 470UF 35V	c43	1.00	EA
381-176	ELEC 10uF 16V SRE-TYPE	c44	1.00	EA
CS1EL106K	TANTAL 10UF 35V CAP	c45	1.00	EA
CS1EL106K	TANTAL 10UF 35V CAP	C46	1.00	EA
CE1EL477R	ELEC 470UF 35V	c47	1.00	EA
CK1HI104M	CHIP 0.1UF 50V(2012)+-20%	C48	1.00	EA
CE1EL476R	ELEC 47UF 16V SRE-TYPE	c49	1.00	EA
CE1EL477R	ELEC 470UF 35V	C50	1.00	EA
CK1HI104M	CHIP 0.1UF 50V(2012)+-20%	c51	1.00	EA
CE1EL476R	ELEC 47UF 16V SRE-TYPE	C52	1.00	EA
CK1HI104M	CHIP 0.1UF 50V(2012)+-20%	c53	1.00	EA
CK1HI104M	CHIP 0.1UF 50V(2012)+-20%	c54	1.00	EA
CK1HI104M	CHIP 0.1UF 50V(2012)+-20%	c55	1.00	EA
CK1HI104M	CHIP 0.1UF 50V(2012)+-20%	C56	1.00	EA
CK3CL222K	CERAMIC 2200pF 1KV	c57	1.00	EA
CK1HI104M	CHIP 0.1UF 50V(2012)+-20%	c59	1.00	EA
CK1HI104M	CHIP 0.1UF 50V(2012)+-20%	C60	1.00	EA
585-154-1	RL105	D01	1.00	EA
585-154-1	RL105	D02	1.00	EA
585-154-1	RL105	D03	1.00	EA
585-154-1	RL105	D04	1.00	EA
585-262	DIODE KDS184(SMD)	D05	1.00	EA
585-154-1	RL105	D06	1.00	EA
585-154-1	RL105	D07	1.00	EA
585-262	DIODE KDS184(SMD)	D08	1.00	EA
585-154-1	RL105	D09	1.00	EA
585-154-1	RL105	D10	1.00	EA
585-262	DIODE KDS184(SMD)	D11	1.00	EA
585-262	DIODE KDS184(SMD)	D12	1.00	EA
585-248	DIODE KDS226(SMD) (KEC)	D13	1.00	EA
585-262	DIODE KDS184(SMD)	D14	1.00	EA
585-154-1	RL105	D15	1.00	EA
585-154-1	RL105	D16	1.00	EA
585-154-1	RL105	D17	1.00	EA
585-154-1	RL105	D18	1.00	EA
585-154-1	RL105	D19	1.00	EA
585-154-1	RL105	D20	1.00	EA
585-154-1	RL105	D21	1.00	EA
585-154-1	RL105	D22	1.00	EA

ITEM NO	DESCRIPTION	FIND NO	QTY	UNIT
585-154-1	RL105	D23	1.00	EA
585-154-1	RL105	D24	1.00	EA
563-063-2	FUSE 250V 0.25A 50F U/C&EU	F3	1.00	EA
564-020	LITTLE FUSE HOLDER 345121	F3	1.00	EA
563-068	FUSE 125V IA 22NM MICRO 101L	F4	1.00	EA
550-799-A	W/H DMM441B 9PIN	J01	1.00	EA
550-799-A	W/H DMM441B 9PIN	J02	1.00	EA
550-799-A	W/H DMM441B 9PIN	J03	1.00	EA
550-799-A	W/H DMM441B 9PIN	J04	1.00	EA
550-800-A	W/H DMM441B 4PIN	J05	1.00	EA
550-802-A	W/H 1PIN RED INPUT	J06	1.00	EA
550-803-A	W/H 1PIN BLK INPUT	J07	1.00	EA
550-804-A	W/H 1PIN BLU INPUT	J08	1.00	EA
550-805-A	W/H 1PIN BRN INPUT	J09	1.00	EA
535-039	AC INLET BCP-03A(3PIN)250V	J10	1.00	EA
550-573-B	WH121A OS-8100	J10	1.00	EA
531-033-7	WAF LW-1143-03 HALIM	J11	1.00	EA
550-642-A	WH122R OS-9000	J11	1.00	EA
531-018-4	WAFER ST'5P'5267-05A	J12	1.00	EA
550-552-A	HEAT SINK FG-8002	J13	1.00	EA
550-653-A	JW604B OS-9000	J14(J14T)	1.00	EA
611-665	TR KRC110S(SMD)	Q1	1.00	EA
611-670	T.R KTC3875Y SOT-23	Q2	1.00	EA
611-672	KTA1504Y SMD	Q3	1.00	EA
611-673	MPSA13 DARINGTON	Q4	1.00	EA
611-673	MPSA13 DARINGTON	Q5	1.00	EA
611-673	MPSA13 DARINGTON	Q6	1.00	EA
611-673	MPSA13 DARINGTON	Q7	1.00	EA
611-673	MPSA13 DARINGTON	Q8	1.00	EA
611-672	KTA1504Y SMD	Q9	1.00	EA
RGCP4954C	M.G 4.95 MOHM 1/2W 0.25%	R01	1.00	EA
RGCP4954C	M.G 4.95 MOHM 1/2W 0.25%	R02	1.00	EA
RMBP8802F	M.F 88KOHM 1/4W 1%	R03	1.00	EA
RMBP9761C	RES M.F 9.76KOHM 1/4W 0.25%	R04	1.00	EA
RMBP8802F	M.F 88KOHM 1/4W 1%	R05	1.00	EA
RMBP9761C	RES M.F 9.76KOHM 1/4W 0.25%	R06	1.00	EA
RM2P3303J	M.F 330K 2W 5%	R07	1.00	EA
RM2P3303J	M.F 330K 2W 5%	R08	1.00	EA
575-014	NETWORK IO AMP 4PIN	R10	1.00	EA
RMAH100IJ	CHIP M.F 1K 1/8W 5%(3216)	R11	1.00	EA
RMAH100IJ	CHIP M.F 1K 1/8W 5%(3216)	R12	1.00	EA
RMAH2402F	CHIP M.F 24K 1/8W 1%(3216)	R13	1.00	EA
RMAH2003F	CHIP M.F 200K 1/8W 1%(3216)	R14	1.00	EA
RMAH3303J	CHIP M.F 330K 1/8W 5%(3216)	R15	1.00	EA

ITEM NO	DESCRIPTION	FIND NO	QTY	UNIT
RMAH3900J	CHIP M.F 390 1/8W 5%(3216)	R16	1.00	EA
RMAH3001J	CHIP M.F 3K 1/8W 5%(3216)	R17	1.00	EA
574-052-2	PT05MP-L1K6001	R18	1.00	EA
RMAH9103J	C H I P M.F 910K 1/8W 5%(3216)	R19	1.00	EA
RMAH1004J	CHIP M.F IM 1/8W 5%(3216)	R20	1.00	EA
RMAH1004J	CHIP M.F IM 1/8W 5%(3216)	R21	1.00	EA
RMAH1003J	CHIP M.F 100K 1/8W 5%(3216)	R22	1.00	EA
RMAH4701J	CHIP M.F 4.7K 1/8W 5%(3216)	R23	1.00	EA
RMAH1004J	CHIP M.F IM 1/8W 5%(3216)	R24	1.00	EA
RMAH4702J	CHIP M.F 47K 1/8W 5%(3216)	R25	1.00	EA
RMAH4702J	CHIP M.F 47K 1/8W 5%(3216)	R26	1.00	EA
RMAH4702J	CHIP M.F 47K 1/8W 5%(3216)	R27	1.00	EA
RMAH1004J	CHIP M.F IM 1/8W 5%(3216)	R28	1.00	EA
RMAH1004J	CHIP M.F IM 1/8W 5%(3216)	R29	1.00	EA
RMAH1000J	CHIP M.F 100 1/8W 5%(3216)	R30	1.00	EA
RMAH1000J	CHIP M.F 100 1/8W 5%(3216)	R31	1.00	EA
RMBP90R0C	M.F 90 OHM 1/4W 0.25%	R32	1.00	EA
RMAH1000J	CHIP M.F 100 1/8W 5%(3216)	R33	1.00	EA
RMBP9R00C	M.F 9-OHM 1/4W 0.25%	R34	1.00	EA
RMBP1801F	M.F 1.8 KOHM 1/4W 1%	R35	1.00	EA
RMBP1820F	M.F 182 OHM 1/4W 1%	R36	1.00	EA
573-150	W.W 1.0HM 1W 0.25%	R37	1.00	EA
RMCP1004F	M.F 1 MOHM 1/2W 1%	R40	1.00	EA
RMAH1001J	CHIP M.F 1K 1/8W 5%(3216)	R41	1.00	EA
RMAH2701F	C H I P M.F 2.7K 1/8W 1%(3216)	R42	1.00	EA
RMBP9101F	M.F 9.1KOHM 1/4W 1%	R43	1.00	EA
RMBP1004F	M.F 1 MOHM 1/4W 1%	R44	1.00	EA
RMAH1003J	CHIP M.F 100K 1/8W 5%(3216)	R45	1.00	EA
RGCP6004J	M.G 6MOHM 1/2W 5%	R46	1.00	EA
RMAH2402J	CHIP M.F 24K 1/8W 5%(3216)	R47	1.00	EA
RMAH3302J	CHIP M.F 33K 1/8W 5%(3216)	R48	1.00	EA
RMAH1003J	CHIP M.F 100K 1/8W 5%(3216)	R49	1.00	EA
RMAH4701J	CHIP M.F 4.7K 1/8W 5%(3216)	R50	1.00	EA
RMAH4701J	CHIP M.F 4.7K 1/8W 5%(3216)	R51	1.00	EA
RM2P4702J	M.F 47K 2W 5%	R52	1.00	EA
RMAH1802J	CHIP M.F 18K 1/8W 5%(3216)	R53	1.00	EA
RMAH2702J	CHIP M.F 27K 1/8W 5%(3216)	R54	1.00	EA
RMAH2702J	CHIP M.F 27K 1/8W 5%(3216)	R55	1.00	EA
RMAH1000J	CHIP M.F 100 1/8W 5%(3216)	R56	1.00	EA
RMAH10R0J	CHIP M.F 10 1/8W 5%(3216)	R57	1.00	EA
RMAH2702F	CHIP M.F 27K 1/8W 1%(3216)	R58	1.00	EA
RMAH2203F	CHIP M.F 220K 1/8W 1%(3216)	R59	1.00	EA
RMAH1002J	CHIP M.F 10K 1/8W 5%(3216)	R60	1.00	EA
RMAH1001J	C H I P M.F 1K 1/8W 5%(3216)	R61	1.00	EA

ITEM NO	DESCRIPTION	FIND NO	QTY	UNIT
RMAH1603J	CHIP M.F 160K 1/8W 5%(3216)	R62	1.00	EA
RMAH1103F	CHIP M.F 110K 1/8W 1%(3216)	R63	1.00	EA
RMAH4701J	CHIP M.F 4.7K 1/8W 5%(3216)	R64	1.00	EA
RMAH7501F	CHIP M.F 7.5K 1/8W 1%(3216)	R65	1.00	EA
RMAH4701J	CHIP M.F 4.7K 1/8W 5%(3216)	R66	1.00	EA
RMAH2701F	CHIP M.F 2.7K 1/8W 1%(3216)	R67	1.00	EA
RDOAP272J	C.F 2.7 KOHM 1/8W 5%	R68	1.00	EA
RMAP8201F	M.F 8.2 KOHM 1/8W 1%	R68	1.00	EA
RMAH20R0J	CHIP M.F 20 1/8W 5%(3216)	R69	1.00	EA
RMAH1003J	CHIP M.F 100K 1/8W 5%(3216)	R70	1.00	EA
RMAH1003J	CHIP M.F 100K 1/8W 5%(3216)	R71	1.00	EA
RMAH1003J	CHIP M.F 100K 1/8W 5%(3216)	R72	1.00	EA
RMAH2201J	CHIP M.F 2.2K 1/8W 5%(3216)	R73	1.00	EA
RMAH20R0J	CHIP M.F 20 1/8W 5%(3216)	R74	1.00	EA
RMAH20R0J	CHIP M.F 20 1/8W 5%(3216)	R75	1.00	EA
RMAH20R0J	CHIP M.F 20 1/8W 5%(3216)	R76	1.00	EA
RMAH20R0J	CHIP M.F 20 1/8W 5%(3216)	R77	1.00	EA
RMAH20R0J	CHIP M.F 20 1/8W 5%(3216)	R78	1.00	EA
RMAH20R0J	CHIP M.F 20 1/8W 5%(3216)	R79	1.00	EA
RMAH20R0J	CHIP M.F 20 1/8W 5%(3216)	R80	1.00	EA
RMAH20R0J	CHIP M.F 20 1/8W 5%(3216)	R81	1.00	EA
RDOCP100J	C.F 10 1/2W 5%	R82	1.00	EA
RMAH4703J	CHCP M.F 470K 1/8W 5%(3216)	R83	1.00	EA
RMAH4703J	CHIP M.F 470K 1/8W 5%(3216)	R84	1.00	EA
RMAH1501J	CHIP M.F 1.5K 1/8W 5%(3216)	R85	1.00	EA
RMAHISOIJ	CHIP M.F 1.5K 1/8W 5%(3216)	R86	1.00	EA
RMAHISOIJ	CHIP M.F 1.5K 1/8W 5%(3216)	R87	1.00	EA
RMAHISOIJ	CHIP M.F 1.5K 1/8W 5%(3216)	R88	1.00	EA
RMAHISOIJ	CHIP M.F 1.5K 1/8W 5%(3216)	R89	1.00	EA
RMAH1501J	CHIP M.F 1.5K 1/8W 5%(3216)	R90	1.00	EA
RMAHIO00J	CHIP M.F 100 1/8W 5%(3216)	R91	1.00	EA
RMAHIO00J	CHIP M.F 100 1/8W 5%(3216)	R92	1.00	EA
RMAHIO00J	CHIP M.F 100 1/8W 5%(3216)	R93	1.00	EA
RMAHIO00J	CHIP M.F 100 1/8W 5%(3216)	R94	1.00	EA
RMAHIO00J	CHIP M.F 100 1/8W 5%(3216)	R95	1.00	EA
RMAHIO00J	CHIP M.F 100 1/8W 5%(3216)	R96	1.00	EA
RMAH20R0J	CHIP M.F 20 1/8W 5%(3216)	R97	1.00	EA
RMAH1004J	CHIP M.F IM 1/8W 5%(3216)	R98	1.00	EA
RMAH1004J	CHIP M.F IM 1/8W 5%(3216)	R99	1.00	EA
526-069	REED RELAY DIA05000 KUAN HIS	RE1	1.00	EA
526-069	REED RELAY DIA05000 KUAN HIS	RE2	1.00	EA
521-117	SPUL 7KEY 10MM LOCK-REL	S1	1.00	EA
521-118R1	SPUL 8KEY 10MM LOCK-REL R1	S2	1.00	EA
521-121	POWER SW JPP2295DA-1	S3	1.00	EA

ITEM NO	DESCRIPTION	FIND NO	QTY	UNIT
521-122	VOLTAGE SELECTOR SW JVS1221M	S4	1.00	EA
574-055	AG15PC152FS-K2M DAIYOYDEN	SG1	1.00	EA
591-274	LF411CN	U01	1.00	EA
591-663	TRUE RMS MX536ACKWE	uo2	1.00	EA
591-650	OP-AMP NJM062M-TI NJRC	uo3	1.00	EA
591-647-1	GD74HC00D SMD	uo4	1.00	EA
591-664	IC OP-AMP C3140AE	uo5	1.00	EA
591-633	TL072CDR2(SMD)	U06	1.00	EA
591-653	COMPARATOR GL393D GOLDSTAR	uo7	1.00	EA
591-651	TIMER KS555D SAMSUNG	U08	1.00	EA
591-271-1	GD4053BDC(SMD)	U09	1.00	EA
591-661	IC A-D CON. TC835CKWE TELEDYNE	U10	1.00	EA
591-665	CHIP SN74LS90. DECADE- COUNTER	U11	1.00	EA
591-665	CHIP SN74LS90. DECADE COUNTER	U12	1.00	EA
591-078	74LS47 TTL	U13	1.00	EA
595-022-9	GL7815	U15	1.00	EA
595-021-9	MC7915CT MOTOROLA	U16	1.00	EA
591-647-1	GD74HC00D SMD	U17	1.00	EA
591-647-1	GD74HC00D SMD	U18	1.00	EA
591-662	DC-DC CON TC7660COA TELEDYNE	U19	1.00	EA
591-310-9	GL7805 REGULATOR GSS	U20	1.00	EA
581-214-1	TRIMMER TZ03P121 FR169	VC1	1.00	EA
581-132-1	TRIMMER TZ03P450FR169	vc2	1.00	EA
571-323	VR TMC3K 500 OHM(SMD)	VR01	1.00	EA
571-321	VR TMC3K 5K(SMD)	VR02	1.00	EA
571-321	VR TMC3K 5K(SMD)	VR03	1.00	EA
571-323	VR TMC3K 500 OHM(SMD)	VR04	1.00	EA
571-323	VR TMC3K 500 OHM(SMD)	VR05	1.00	EA
571-315	VR TMC3K 10K(SMD)	VR06	1.00	EA
571-323	VR TMC3K 500 OHM(SMD)	VR08	1.00	EA
571-316	VR VG033CXHT 20K SMD	VR09	1.00	EA
571-320	VR TMC3K 2K(SMD)	VR10	1.00	EA
571-319	VR TMC3K 1K(SMD)	VR11	1.00	EA
571-316	VR VG033CXHT 20K SMD	VR12	1.00	EA
571-316	VR VG033CXHT 20K SMD	VR13	1.00	EA
571-321	VR TMC3K 5K(SMD)	VR14	1.00	EA
571-323	VR TMC3K 500 OHM(SMD)	VR15	1.00	EA
648-051	OSC IOMHZ SCO-020 SUNNY	Y1	1.00	EA
585-056-1	MTZJ5.6B ZENER ROHM	Z1	1.00	EA
585-056-1	MTZJ5.6B ZENER ROHM	Z2	1.00	EA
591-640	KA431CZ (TO-92) SAMSUNG	Z3	1.00	EA
586-002	VOLTAGE REF. TC04ACZM TELCOM	Z4	1.00	EA
2919-024-1	INSULATOR PC0.25T		1.00	EA
MBT03C08B	TAPTITE B TYPE NI WASHER MOL		1.00	EA

7-1-2. FRONT BOARD ASS'Y(511-578-A)

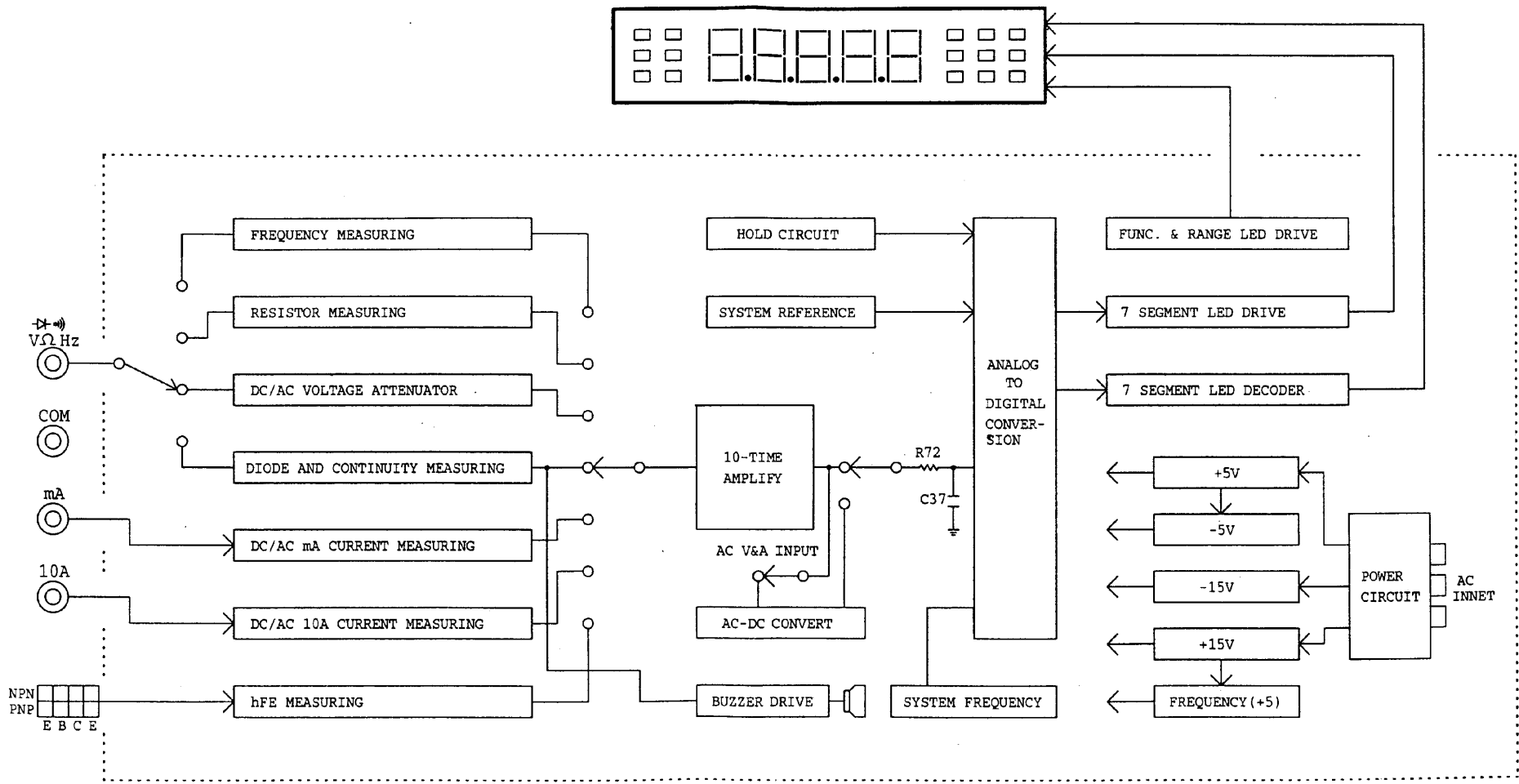
ITEM NO	DESCRIPTION	FIND NO	QTY	UNIT
531-441	HFE SOCKET ESQ-104-12-G-D	J1	1.00	EA
588-053	201 3X6 FUNCTION DISPLAY	LD01	1.00	EA
588-053	201 3X6 FUNCTION DISPLAY	LD02	1.00	EA
588-053	201 3X6 FUNCTION DISPLAY	LD03	1.00	EA
588-053	201 3X6 FUNCTION DISPLAY	LD04	1.00	EA
588-053	201 3X6 FUNCTION DISPLAY	LD05	1.00	EA
588-053	20i 3X6 FUNCTION DISPLAY	LD06	1.00	EA
588-053	201 3X6 FUNCTION DISPLAY	LD07	1.00	EA
588-053	201 3X6 FUNCTION DISPLAY	LD08	1.00	EA
588-053	201 3X6 FUNCTION DISPLAY	LD09	1.00	EA
588-053	201 3X6 FUNCTION DISPLAY	LD10	1.00	EA
588-053	201 3X6 FUNCTION DISPLAY	LD11	1.00	EA
588-053	201 3X6 FUNCTION DISPLAY	LD12	1.00	EA
588-053	201 3X6 FUNCTION DISPLAY	LD13	1.00	EA
588-053	201 3X6 FUNCTION DISPLAY	LD14	1.00	EA
588-053	201 3X6 FUNCTION DISPLAY	LD15	1.00	EA
588-054	7SEGMENT KD-G5622AM	LD16	1.00	EA
588-054	7SEGMENT KD-G5622AM	LD17	1.00	EA
588-055	7SEGMENT KD-G5612AM	LD18	1.00	EA
531-025-4	WAFER ST ' 9P ' 5267-09A	PI	1.00	EA
531-025-4	WAFER ST ' 9P ' 5267-09A	P2	1.00	EA
531-025-4	WAFER ST ' 9P ' 5267-09A	P3	1.00	EA
531-025-4	WAFER ST ' 9P ' 5267-09A	P4	1.00	EA
531-003-4	WAFER ST ' 4P ' 5267-04A	P5	1.00	EA
550-641-SR1	WH121S OS-3000 REV.1	P6	1 .00	EA
591-054-2	SN74LS02N MOTOROLA	UI	1.00	EA
572-340	VR CT- 6P-5KB	VR7	1.00	EA
513-578R5	DM441B FRONT B/D REV.5		1.00	EA

7-1-3. INPUT BOARD ASS'Y(511-579-A)

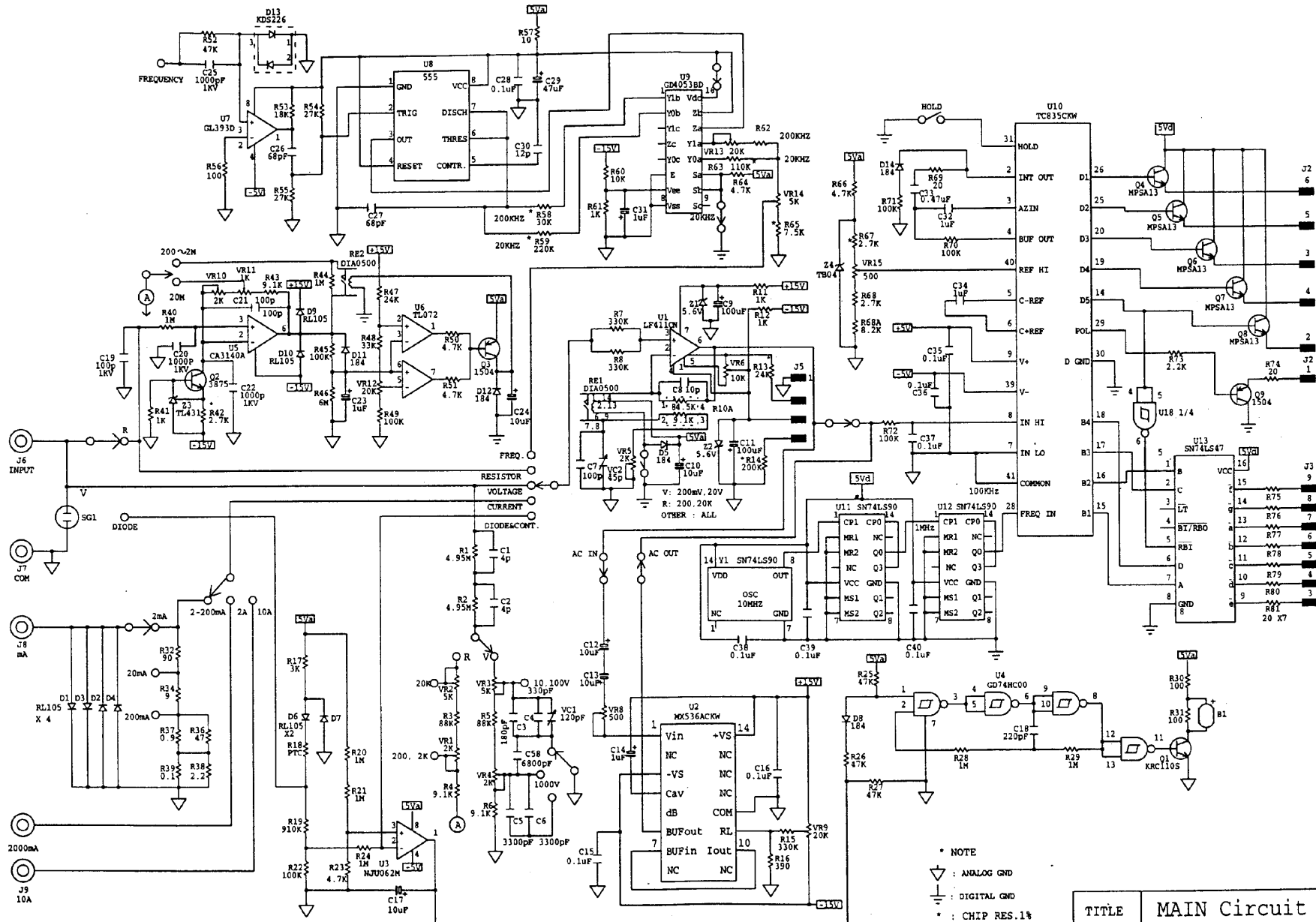
ITEM NO	DESCRIPTION	FINDNO	QTY	UNIT
CK1HR103Z	CER 0.01UF 50V Z T.P	CI	1.00	EA
585-120	DIODE ISS133 HDS0437	D1	1.00	EA
563-035-2	FUSE 250V 2A 50F U/C&EU	F1	1.00	EA
564-021	2A FUSE HOLDER	F1	1.00	EA
563-066	250V 10A H314010 ULE1408	F2	1.00	EA
564-019	FUSE HOLDER FC61B10A	F2	1.00	EA
531-002-4	WAFER ST'3P'5267-03A	J1	1.00	EA
334-013-1	INPUT CORE BLACK DMM	P7	1.00	EA
334-013-2	INPUT CORE RED DMM	P7	1.00	EA
334-013-2	INPUT CORE RED DMM	P8	1.00	EA
334-013-2	INPUT CORE RED DMM	P9	1.00	EA
611-001-1	KTC1815-Y OR KTC3198-Y	Q1	1.00	EA
RDOBP750J	C.F 75 OHM 1/4W 5%	R01	1.00	EA
RDOBP103J	C.F 10 KOHM 1/4W 5%	R02	1.00	EA
RDOBP471J	C.F 470 OHM 1/4W 5%	R03	1.00	EA
RDOBP121J	C.F 120 OHM 1/4W 5%	R04	1.00	EA
573-129-1	W.W 0.1 OHM 5W 0.25%	R05	1.00	EA
873-028R	MANGANIN WIRE CM2 0.01	R100	1.00	EA
526-068	RY*12 G.S	RE1	1.00	EA
585-056-1	MTZJ5.6B ZENER ROHM	Z1	1.00	EA
513-579R5	DM441B INPUT B/D REV.5		1.00	EA

7-2. MECHANICAL PARTS LIST

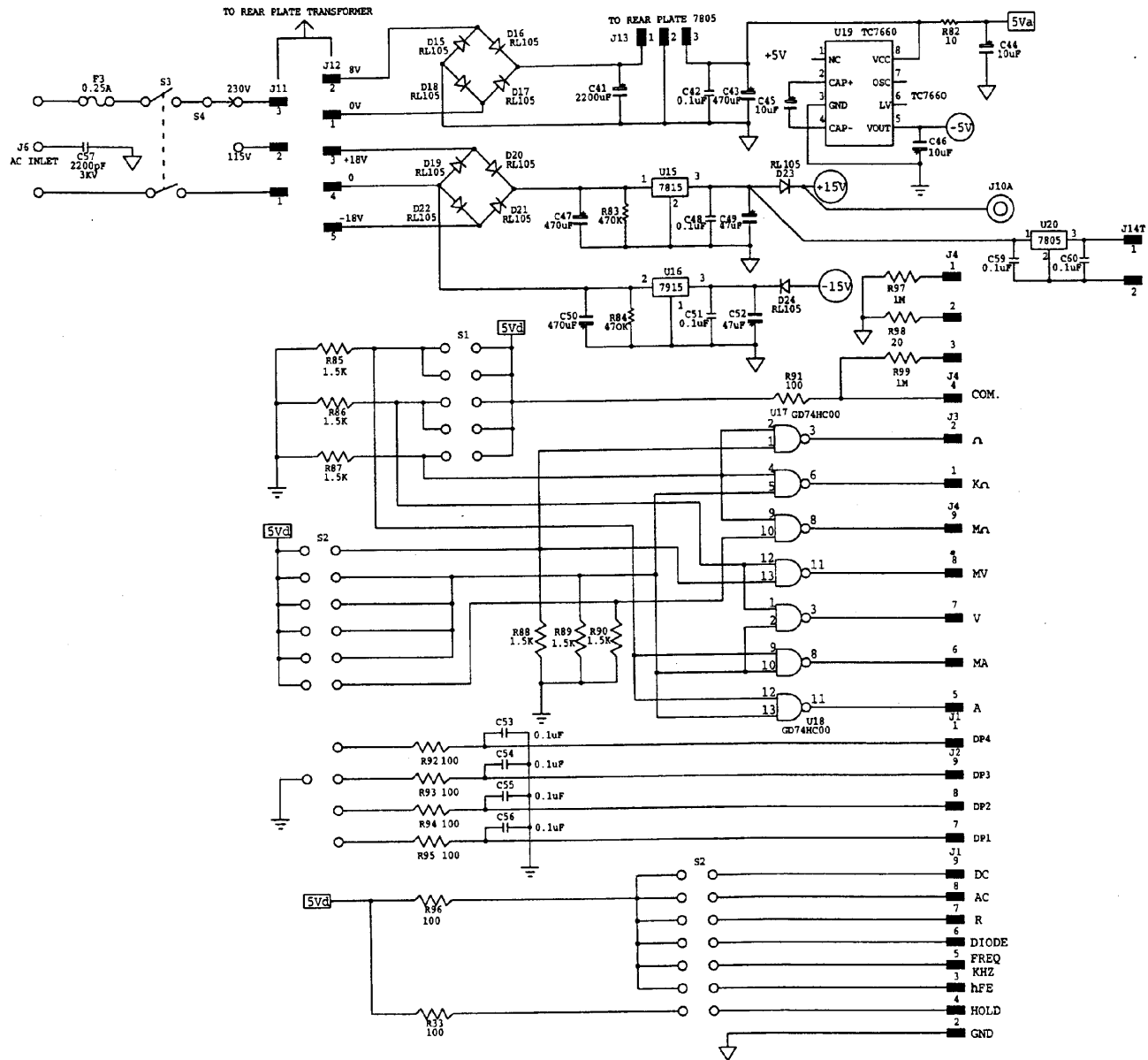
NO	ITEM NO	DESCRIPTION	QTY	UNIT
1	215-140-1	TOP CASE	1	EA
2	215-140-2	BOTTOM CASE	1	EA
3	215-141	FRONT CASE	1	EA
4	369-203	KNOB-POWER	1	EA
5	369-204-1	KNOB-FUNCTION	9	EA
6	369-204-2	KNOB-RANGE	6	EA
7	242-295	REAR PLATE	1	EA
8	219-201	SHIELD COVER-T	1	EA
9	219-202	SHIELD COVER-B	1	EA
10	381-020	WINDOW	1	EA
11	919-024	INSULATOR	1	EA
12	242-288-9	NAME PLATE	1	EA
13	367-430	HANDLE	1	EA
14	360-032	DOWN FOOT ASSY	4	EA
15	334-013-1	INPUT CORE-B	1	EA
16	334-013-2	INPUT CORE-R	3	EA
17	873-028	Mn WIRE	1	EA
18	MBT03C08B	SCREW, TAPTITE, M3X8	4	EA
19	MBT04-08B	SCREW, M4X8	2	EA
20	315-040	SCREW, TAPPING	2	EA
21	MBC03-06J	SCREW, M3X6	3	EA
22	MBC04-10J	SCREW, M4X10	2	EA
23	MBC03-10J	SCREW, M3X10	1	EA
24	NHB04-00J	NUT, M4	2	EA
25	NHB03-00J	NUT, M3	1	EA
26	WSB04-00J	WASH, SPRING, M4	2	EA
27	WSB03-00J	WASH, SPRING, M3	1	EA





TITLE	block diagram
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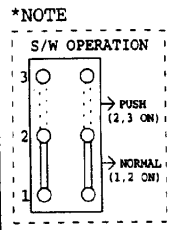
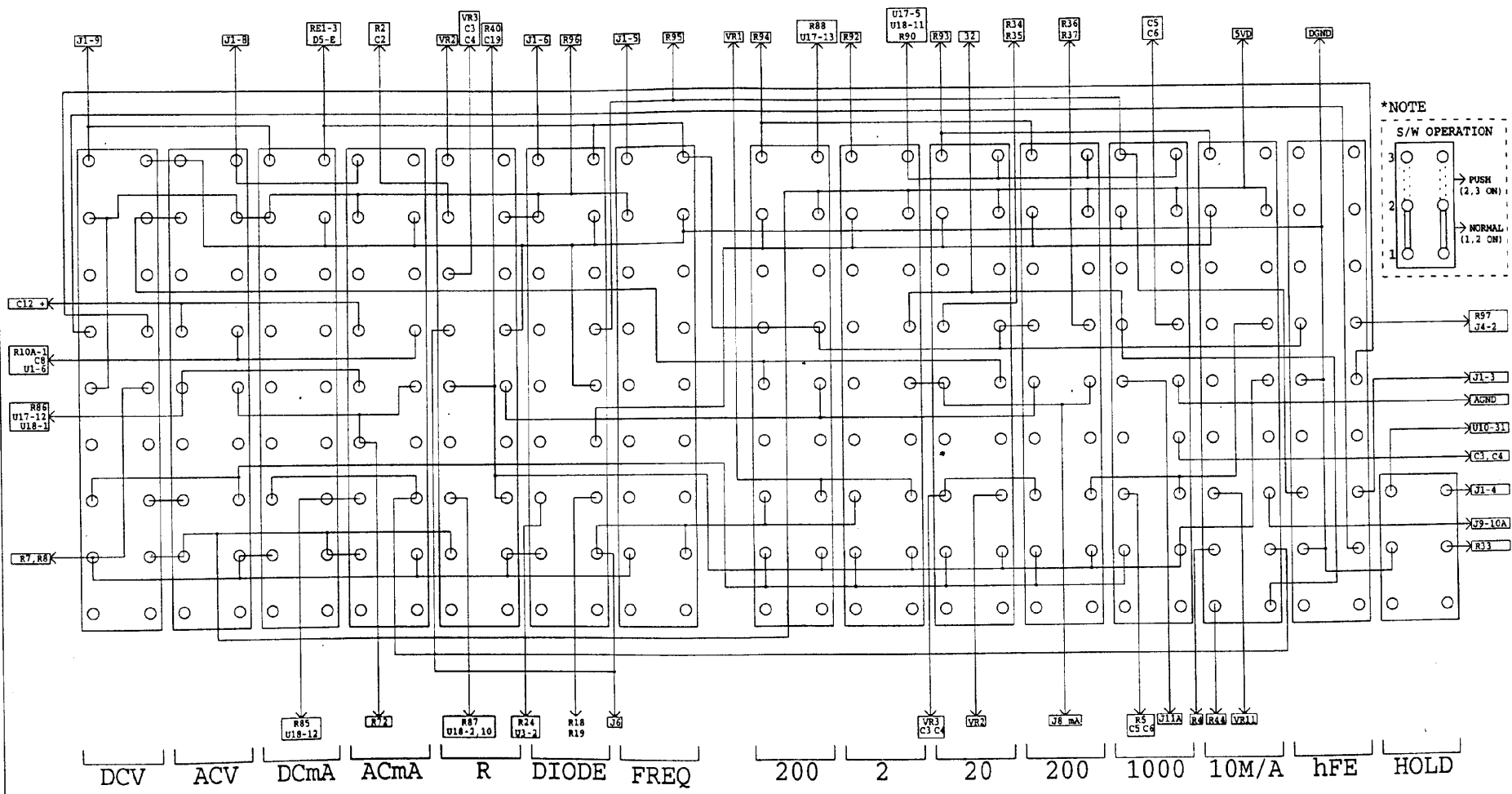


TITLE	MAIN Circuit unit
DWG NO.	511-577-A(1/3)



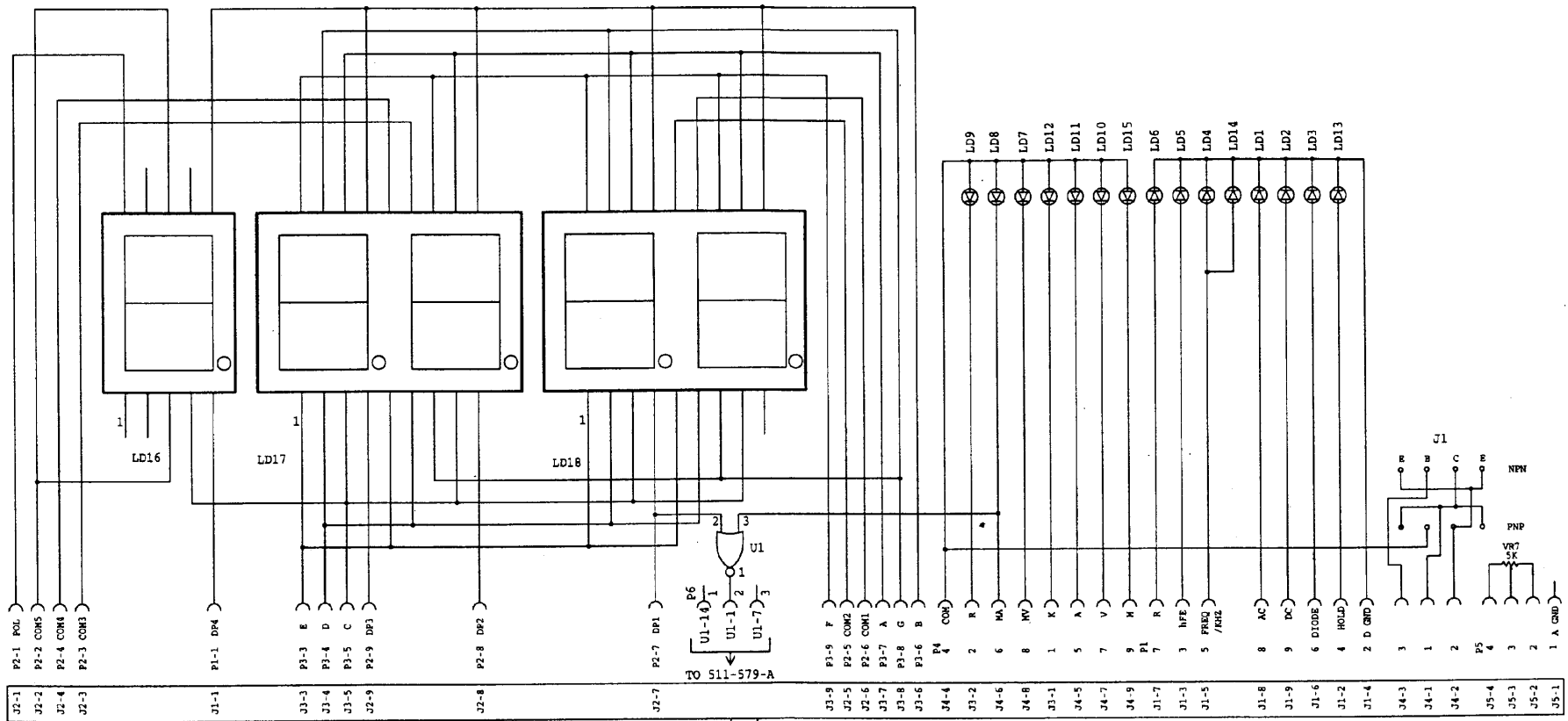
* NOTE
 : ANALOG GND
 : DIGITAL GND

TITLE	MAIN Circuit unit
DWG NO.	511-577-A(2/3)



DCV ACV DCmA ACmA R DIODE FREQ 200 2 20 200 1000 10M/A hFE HOLD

TITLE	MAIN Circuit Switch connection diagram
DWG NO.	511-577-A(3/3)

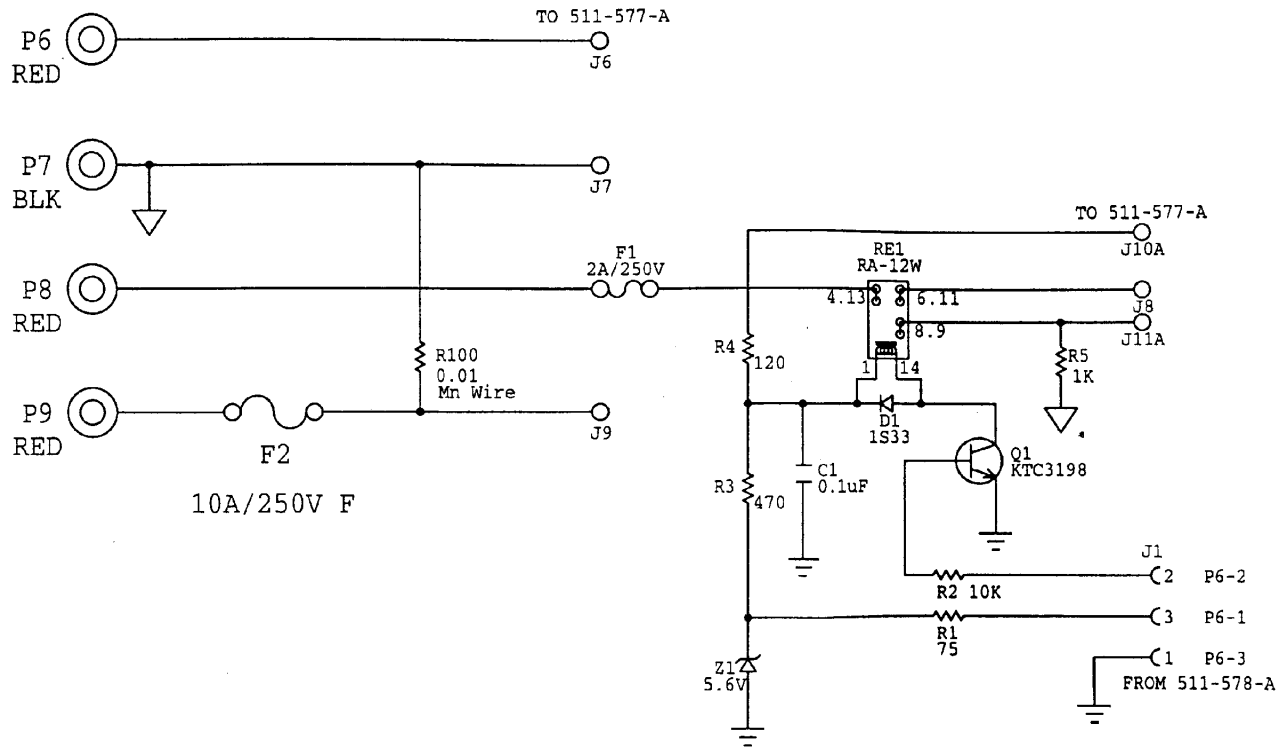


511-577-A

P/N	CONNECTION	P/N	CONNECTION
1	E CATHODE	6	B CATHODE
2	D CATHODE	7	A CATHODE
3	COM ANODE	8	COM ANODE
4	C CATHODE	9	F CATHODE
5	DP CATHODE	10	G CATHODE

P/N	CONNECTION	P/N	CONNECTION
1	DIG1 SEG E	10	DIG2 SEG B
2	DIG1 SEG D	11	DIG2 SEG A
3	DIG1 SEG C	12	DIG2 SEG F
4	DIG1 SEG DP	13	DIG2 COMMON
5	DIG2 SEG E	14	DIG1 COMMON
6	DIG2 SEG D	15	DIG1 SEG B
7	DIG2 SEG G	16	DIG1 SEG A
8	DIG2 SEG C	17	DIG1 SEG G
9	DIG2 SEG DP	18	DIG1 SEG F

TITLE	FRONT Circuit unit
DWG NO.	511-578-A



TITLE	INPUT Cir
DWG NO.	511-5

