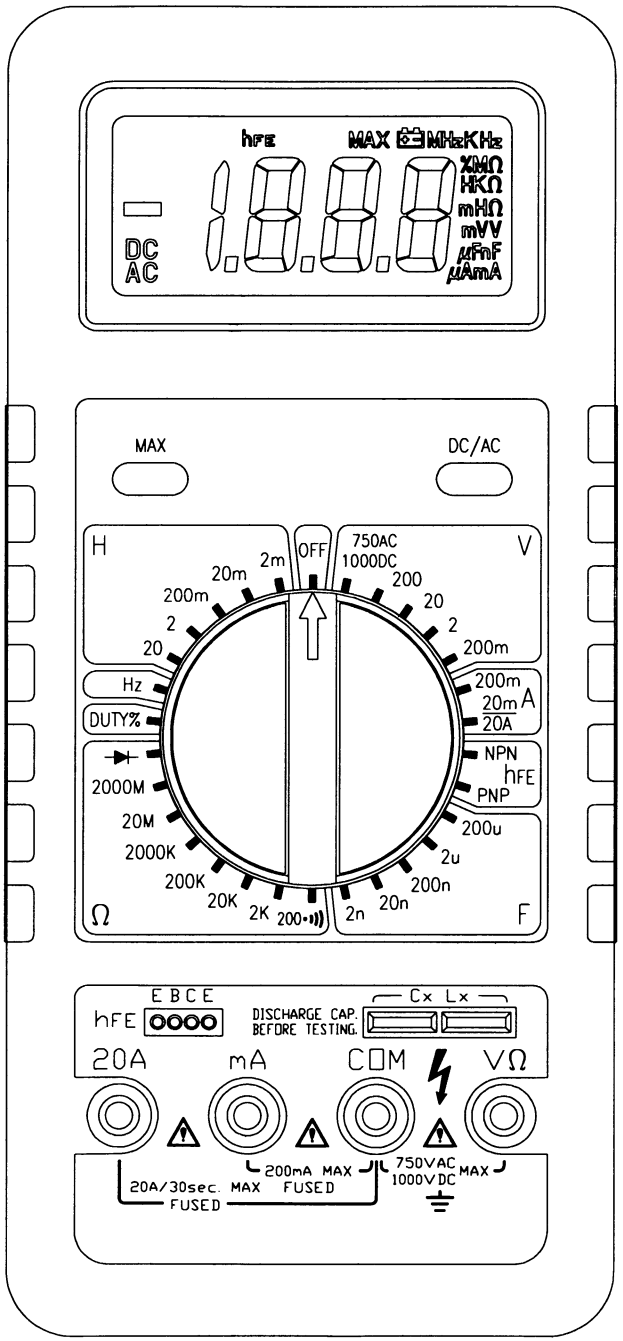
OPERATING INSTRUCTIONS
MODEL 20
DIGITAL MULTIMETER



SAFETY INFORMATION

The following safety information must be observed to insure maximum personal safety during the operation at this meter:

1. Do not use the meter if the meter or test leads look damaged, or if you suspect that the meter is not operating properly.
2. This meter is not recommended for high voltage industrial use; for example, not for measurements of 440 VAC or 600 VAC industrial power mains. The unit is intended for use with low energy circuits to 1000VDC or 750VAC or high energy circuit to 250 VAC or DC. Accidental misuse by connection across a high voltage, high energy power source when the meter is set up for mA measurement may be very hazardous.
3. Turn off power to the circuit under test before cutting, unsoldering, or breaking the circuit. Small amounts of current can be dangerous.
4. Use caution when working above 60V dc or 30V ac rms. Such voltages pose a shock hazard.
5. When Using the probes, keep your fingers behind the finger guards on the probes.
6. Measuring voltage which exceeds the limits of the multimeter may damage the meter and expose the operator to a shock hazard. Always recognize the meter voltage limits as stated on the front of the meter.

DC VOLTS
Ranges: 200mV, 2V, 20V, 200V, 1000V
Resolution: 100μV
Accuracy: ±(0.5% rdg + 1dgt)
Input impedance: 10MΩ
Overload protection: 1000VDC or 750VAC rms

AC VOLTS (50Hz - 500Hz)
Ranges: 200mV, 2V, 20V, 200V, 750V
Resolution: 100μV
Accuracy:
±(1.5% rdg + 4dgts) on 200mV to 200V ranges
±(2.0% rdg + 4dgts) on 750V ranges
Input impedance: 10MΩ
Overload protection: 1000VDC or 750VAC rms

DC CURRENT
Ranges: 20mA, 200mA, 20A
Accuracy: ±(1.5% rdg + 1dgt) on mA range
±(3.0% rdg + 1dgt) on 20A range
Input protection: 0.5A / 250V fast blow fuse
20A / 600V fast blow ceramic fuse

AC CURRENT (50Hz - 500Hz)
Ranges: 20mA, 200mA, 20A
Accuracy: ±(2.0% rdg + 4dgt) on mA range
±(3.5% rdg + 4dgts) on 20A range
Input protection: 0.5A / 250V fast blow fuse
20A / 600V fast blow ceramic fuse

SPECIFICATIONS

Display: 3½ digit liquid crystal display (LCD) with a maximum reading of 1999.
Polarity: Automatic, positive implied, negative polarity indication.
Overrange: (OL) or (-OL) is displayed.
Zero: Automatic.
Low battery indication: the " ⊟ " is displayed when the battery voltage drops below the operating level.
Measurement rate: 2.5 times per second, nominal.
Operating Environment: 0°C to 50°C at < 70% relative humidity.
Storage Temperature: -20°C to 60°C, 0 to 80% R.H. with battery removed from meter.
Accuracy: Stated accuracy at 23°C ± 5°C, <75% relative humidity.
Power: single standard 9-volt battery, NEDA 1604, JIS 006P, IEC 6F22.
Battery life: 150 hours typical with carbon-zinc.
Dimensions: 200mm (H) x 90mm (W) x 40mm (D).
Weight: Approx. 14 oz. (400g) including battery.
Accessories: One pair test leads, One spare fuse installed, 9V battery (installed) and Operating Instructions.

RESISTANCE
Ranges: 200Ω, 2KΩ, 20KΩ, 200KΩ, 2000K, 20MΩ, 2000MΩ
Accuracy:
±(1.0% rdg + 4dgts) on 200Ω range
±(0.8% rdg + 2dgts) on 2KΩ to 2000K ranges
±(3.0% rdg + 4dgts) on 20MΩ range
±[(5.0% rdg - 10dgts) + 10dgts] on 2000MΩ range
Open circuit volts:
0.3Vdc (3.0Vdc on 200Ω and 2000MΩ ranges)
Overload protection: 500VDC or AC rms

CONTINUITY
Audible indication: less than 40Ω±20Ω
Overload protection: 500VDC or AC rms

DIODE TEST
Test current: 1.0mA ± 0.6mA
Accuracy: ±(3.0% rdg + 3dgt)
Open circuit volts: 3.0Vdc typical
Overload protection: 500VDC or AC RMS

CAPACITANCE
Ranges: 2nF, 20nF, 200nF, 2μF, 200μF
Accuracy: ±(5.0% rdg + 10dgts) on all ranges
±(8.0% rdg + 10dgts) above 100μF
Test frequency: 200Hz

INDUCTANCE

Ranges: 2mH, 20mH, 200mH, 2H, 20H
Accuracy:±(5.0% rdg + 20dgts) on 2mH
±(5.0% rdg + 10dgts) on other ranges
Test frequency: 200Hz
Test conditions: quality factor > 5 in 200Hz

FREQUENCY (Autoranging)

Ranges: 2kHz, 20kHz, 200kHz, 2000kHz, 15MHz
Accuracy: ±(0.5% rdg + 1dgt) on all ranges
Sensitivity: 1.0Vrms min.
Overload protection: 500VDC or AC rms

DUTY CYCLE

Ranges: 1.0% to 90.0%
Resolution: 0.1%
Accuracy: ±(1.0% rdg + 10dgts)
Pulse Width: >50μsec,>20Hz ,<20kHz TTL signal
Overload protection: 500VDC or AC rms

TRANSISTOR h_{FE}

Ranges: 0 - 1000
Base current: 10μAdc approx. (Vce=3.0Vdc)

OPERATION

Before taking any measurements, read the Safety Information Section. Always examine the instrument for damage, contamination (excessive dirt, grease, etc.) and defects. Examine the test leads for cracked or frayed insulation. If any abnormal conditions exist do not attempt to make any measurements.

Max. Hold Feature

Press "MAX" to toggle in and out of the Maximun Hold mode.(holding the highest reading.) In the MAX mode, the MAX annunciator is displayed and maximun reading are stored in display register, If the new reading is higher than the reading being displayed, the higher reading is transferred to the display register. A "higher" reading is defined as the reading with the higher absolute value.

The MAX hold function is also available in the frequency count mode. The counter autoranging feature is disable when MAX hold is selected.

Voltage Measurements

1. Connect the red test lead to the "VΩ" jack and the black test lead to the "COM" jack.
2. Set the Function/Range switch to the desired voltage range and press the "AC/DC" switch to toggle between the desired voltage type. If magnitude of voltage is not known, set switch to the highest range and reduce until a satisfactory reading is obtained.
3. Connect the test leads to the device or circuit being measured.
4. For dc, a (-) sign is displayed for negative polarity; positive polarity is implied.

Current Measurements

1. Set the Function/Range switch to the desired current range and press the "AC/DC" switch toggle between to the desired current type.
2. For current measurements less than 200mA, connect the red test lead to the mA jack and the black test lead to the COM jack.
3. For current measurements of 200mA or greater, connect the red test lead to the 20A jack and the black test lead to the COM jack.
4. Remove power from the circuit under test and open the normal circuit path where the measurement is to be taken. Connect the meter **in series** with the circuit.

Resistance and Continuity Measurements

1. Set the Function/Range switch to the desired resistance range or continuity position.
2. Remove power from the equipment under test.
3. Connect the red test lead to the "VΩ" jack and the black test lead to the "COM" jack.
4. Touch the probes to the test points. In ohms, the value indicated in the display is the measured value of resistance. In continuity test, the beeper sounds continuously, if the resistance is less than 40Ω±20Ω.

Diode Tests

1. Connect the red test lead to the "VΩ" jack and the black test lead to the "COM" jack.
2. Set the Function/Range switch to the " ⊣◀ " position.
3. Turn off power to the circuit under test.
4. Touch probes to the diode. A forward-voltage drop is about 0.6V (typical for a silicon diode).
5. Reverse probes. If the diode is good, "OL" is displayed. If the diode is shorted, ".000" or another number is displayed.
6. If the diode is open, "OL" is displayed in both directions.
7. If the junction is measured in a circuit and a low reading is obtained with both lead connections, the junction may be shunted by a resistance of less than 1kΩ. In this case the diode must be disconnected from the circuit for accurate testing.

Capacitance & Inductance Measurements

1. Set the Function/Range switch to the desired Cx (capacitance) or Lx (inductance) range.
2. Never apply an external voltage to the Cx Lx sockets. Damage to the meter may result.
3. Insert the capacitor or inductance leads directly into the Cx Lx socket.
4. Read the capacitance or inductance directly from the display.

Transistor Gain Measurements

1. Set the Function/Range switch to the desired h_{FE} range (PNP or NPN type transistor).
2. Never apply an external voltage to the h_{FE} sockets. Damage to the meter may result.
3. Plug the transistor directly into the h_{FE} socket. The sockets are labeled E, B, and C for emitter, base, and collector.
4. Read the transistor h_{FE} (dc gain) directly from the display.

Frequency Measurements

1. Set the Function/Range switch to the Hz position.
2. Connect the red test lead to the "VΩ" jack and the black test lead to the "COM" jack.
3. Connect the test leads to the point of measurement and read the frequency from the display.

Duty Cycle Measurements

1. Set the Function/Range switch to the DUTY% position.
2. Connect the red test lead to the "VΩ" jack and the black test lead to the "COM" jack.
3. Connect the test leads to the point of measurement .The display will indicate 1.0% to 90.0% of the frequency duty cycle.

MAINTENANCE

WARNING
Remove test leads before changing battery or fuse or performing any servicing.

Battery Replacement

Power is supplied by a 9 volt "transistor" battery. (NEDA 1604 IEC 6F22). The " ⊟ " appears on the LCD display when replacement is needed. To replace the battery, remove the two screws from the back of the meter and lift off the battery case. Remove the battery from battery contacts.

Fuse Replacement

If no current measurements are possible, check for a blown overload protection fuse. There are two fuses; F1 for the "mA" jack and F2 for the "20A" jack. For access to fuses, remove the two screws from the back of the meter and lift off the battery case. Replace F1 only with the original type 0.5A/250V, fast acting fuse. Replace F2 only with the original type 20A/600V, fast acting ceramic fuse.

P/N :7008-0020-1

20 CALIBRATION PROCEDURE

The procedure should be performed at an ambient temperature of 25 ℃ ±2 ℃ , and at a relative humidity of less than 75 % 。

A. DCV Calibration

— Set the range to the "200mv" position 。

— Set the output of the DC calibrator for 190mv ±0.02 %. and connect it to the "V-Ω" , and "COM" input jacks 。

— Slowly adjust the "R44" until the display reads 190.0mv ±1 digit 。

— Carefully inspect the other DCV ranges, your reading should be within the specification of instruction manual 。

— There is no adjustable parts for the ACV range, your reading should be within the specification of instruction manual 。

B. DCA Calibration

— Set the range to the "20A" position 。

— Set the output of the DC calibrator for 1.9A ±0.02 %. and connect it to the "20A" , and "COM" input jacks 。

— Adjust "Shunt resistance" until the display reads 1.9A,if the reading is over 1.9A, add solder onto Shunt resistance , on the contrary the reading is under 1.9A, shave away some of solder from it ,carefully inspect the other ranges , your reading should be within the spec of instruction manual 。

C. Capacitance and Inductance calibration

ZERO adjustment

— Set the range to the "2mH" position, and shorting Lx jacks 。

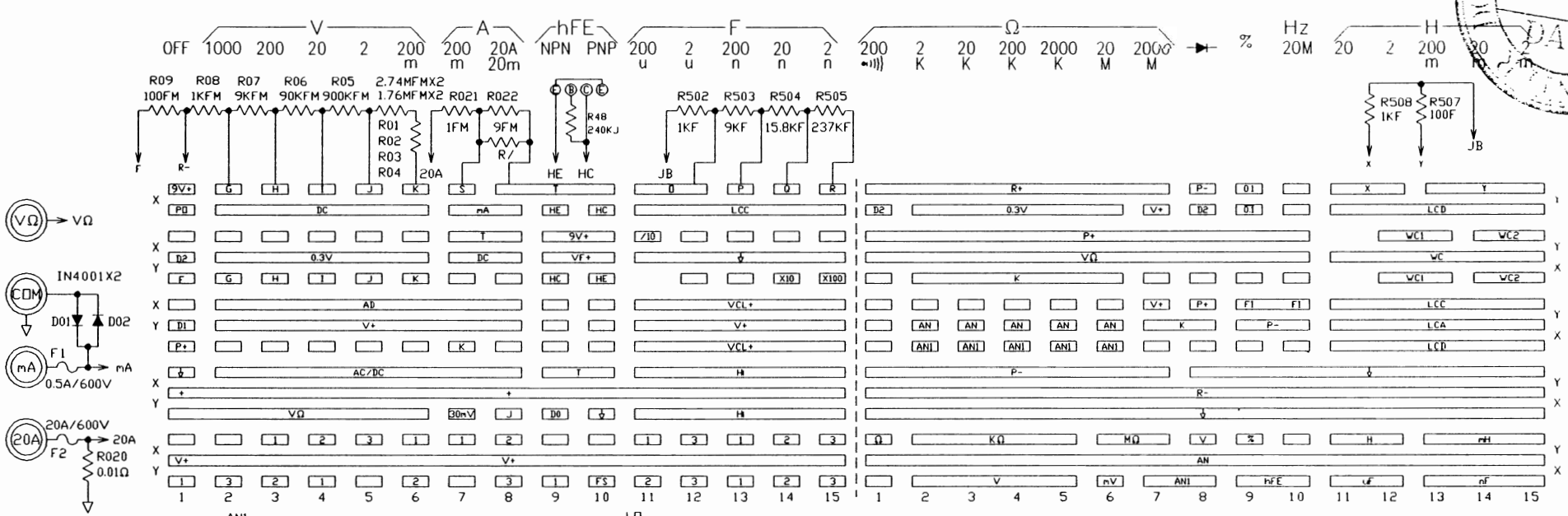
— Slowly adjust the "R520" until the display reads 000.0 。

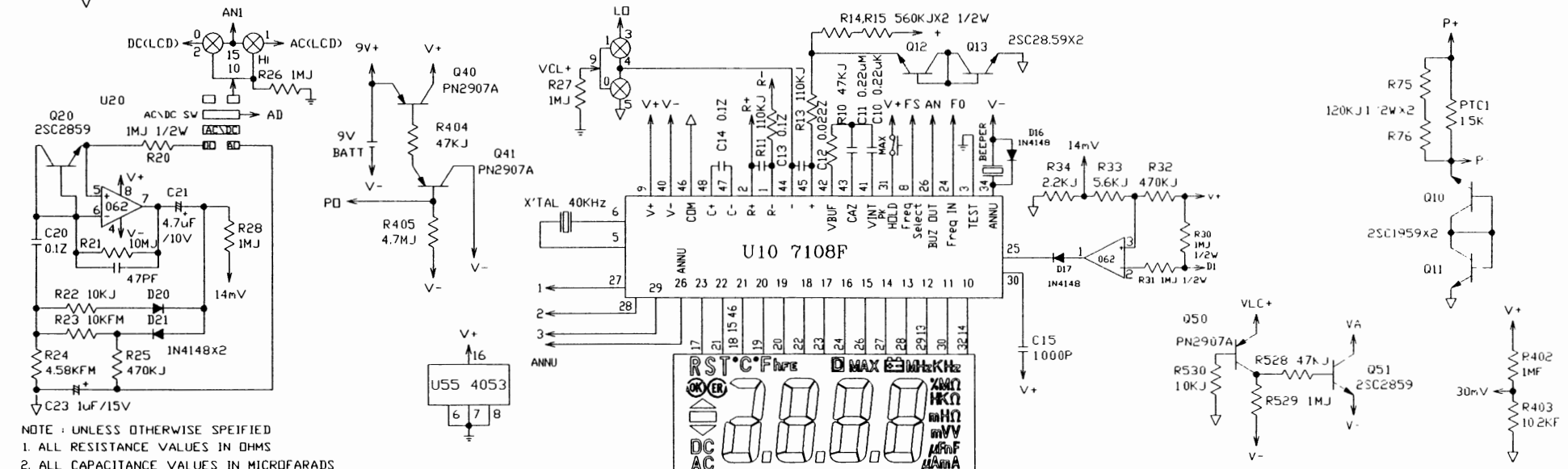
ACCURACY adjustment

— Set the range to the "200NF" position, and using 100NF capacitor to adjust R55 until the display reads 100NF 。

— Set the range to the "200UF" position, and using 100UF capacitor to adjust R551 until the display reads 100UF 。

MODEL:20SMD



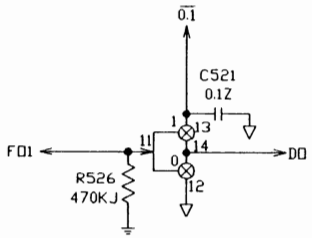


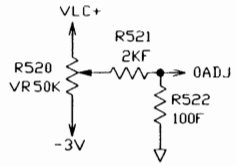
NOTE : UNLESS OTHERWISE SPEIFIED
1. ALL RESISTANCE VALUES IN OHMS
2. ALL CAPACITANCE VALUES IN MICROFARADS
3. ALL THE COMPONENTS ARE MARKED WITH ' * '
   THAT VALUES IS VARIABLE.

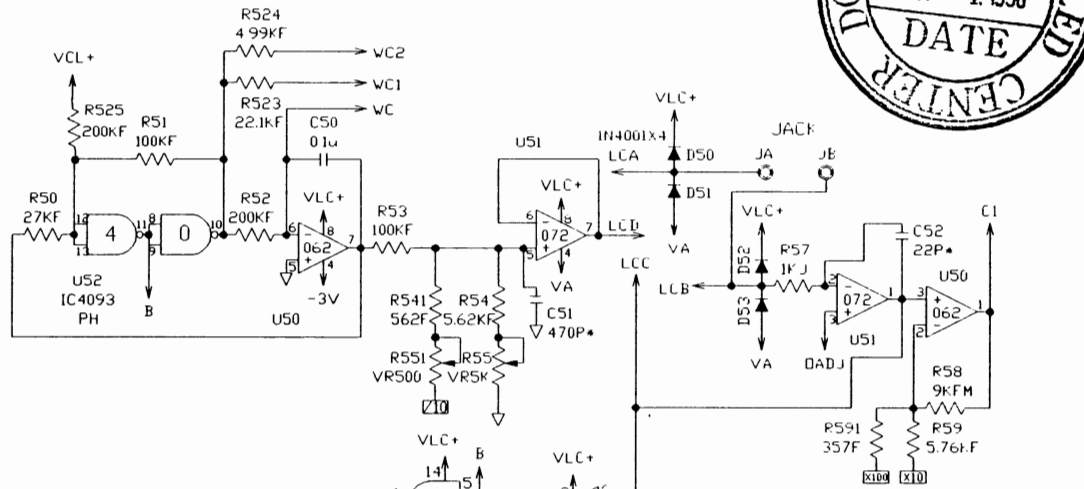
文件編號	RC-0020S-S	料號	
文件名稱	20SMD 線路圖	圖號	0020S-S.DWG
版本	第 版 次	頁次	第 頁 共 頁

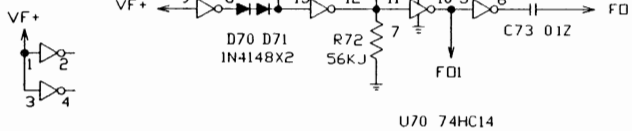
CHY 連虹股份有限公司
TEL:(06)2794811 FAX:(06)2700227

文管中心	連虹作	連虹核	單位經管	製作者
84.7.24 廖秋雲	84.7.24 謝啓地	84.7.24	84.7.24 謝啓地	84.7.24

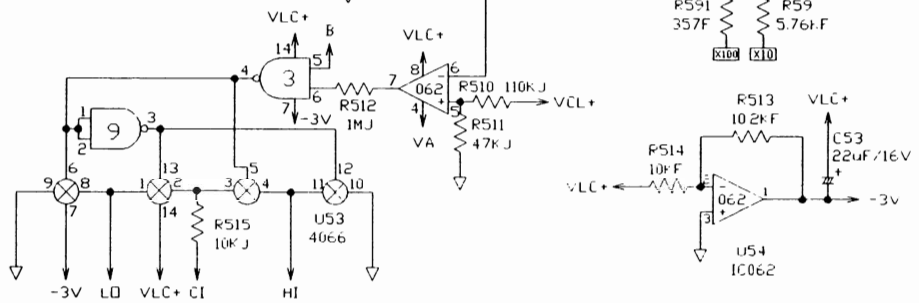


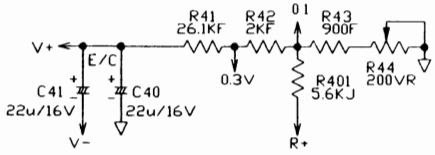


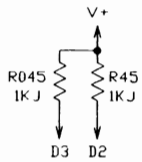


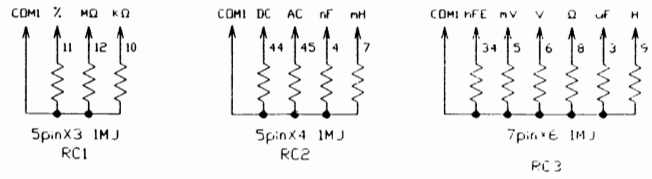


U70 74HC14









文件編號	RC-0020S-S1	料　號	
文件名稱	20SMD 線路圖	圖　號	0020S-S1.DWG
版　本	第 1 版 第 3 次	頁　次	第 2 頁 共 2 頁

CHY 連虹股份有限公司
TEL (06)2794811 FAX.(06)2700227

文管登錄	核准	審核	單位主管	製圖者
85.5.16	85.5.15	85.5.15	85.5.15	85.5.15
康秋雪	謝彦坤		謝彦坤	謝彦坤