

# Protek B818

## Multi-Function Counter

### Multi-Function Counter









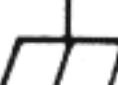





◆ INSTALLATION CATEGORY INFORMATION ◆

This instrument may be damaged if operated with LINE VOLTAGE (AC 100/120/220/230V  $\pm 10\%$ ) set for the wrong applied ac input-source voltage or if the wrong line fuse is installed.

Before connecting the power cord to a power input-source is set for the correct nominal ac input-source voltage and line fuse.

The power-source must be stand where put out easily when happen a problem of instrument

NO.	SYMBOLE	DESCRLPTION	NO.	SYMBOLE	DESCRLPTION
1		Direct current	7		OFF (SUPPLY)
2		Altemating current	8		Equioment protected throughout by DOUBLE INSULATION or REINFORCED INSULATION (equivalent to Class II of IEC 536-see annex H)
3		Earth (ground) TERMINAL	9		Caution, risk of electric shock Easlly-touched higher temperature parts
4		PROTECTIVE CONDUCTOR ERMINAL	10		Caution (refer to accompanying documents)
5		Frame or chassis TERMINAL	11		In-position of a bistable push control
6		ON (SUPPLY)	12		Out-position of a bistable push control

## SUMMARY SAFETY

Normal use of test equipment exposes you to a certain amount of danger from electrical shock because testing must often be performed where exposed high voltage is present. An electrical shock causing 10 milliamps of current to pass through the heart will stop most human heartbeats. Voltage as low as 35 volts dc or ac rms should be considered dangerous and hazardous since it can produce a lethal current under certain conditions. Higher voltage poses an even greater threat because such voltage can more easily produce a lethal current. Your normal work habits should include all accepted practices that will prevent contact with exposed high voltage, and that will steer current away from your heart in case of accidental contact with a high voltage. You will significantly reduce the risk factor if you know and observe the following safety precautions.

1. Don't expose high voltage needlessly in the equipment under test. Remove housings and covers only when necessary. Turn off equipment while making test connections in high voltage circuits. Discharge high voltage capacitors after removing power.
2. If possible, familiarize yourself with the equipment being tested and location of its high voltage points. However, remember that high voltage may appear at unexpected points in defective equipment.
3. Use an insulated floor material or a large, insulated floor mat to stand on, and an insulated work surface on which to place equipment; make certain such surfaces are not damp and wet.
4. When testing ac powered equipment, remember that ac line voltage is usually present on some power input circuits such as the on-off switch, fuses, power transformer, etc. Anytime the equipment is connected to an ac outlet, even if the equipment is turned off.
5. On test instruments or any equipments with a 3-wire ac power plug, use only a 3-wire outlet. This is a safety feature to keep the housing or other exposed elements at earth ground.
6. Never work alone. Someone should be nearby to render aid if necessary. Training in first aid is highly recommended.

# TABLE OF CONTENTS

SECTION	TITLE	PAGE
<b>1</b>	<b>INTRODUCTION &amp; SPECIFICATIONS</b>	<b>2</b>
	1. INTRODUCTION	2
	2. SPECIFICATIONS	2
<b>2</b>	<b>OPERATION</b>	<b>4</b>
	1. INTRODUCTION	4
	2. PREPARATION FOR USE	4
	3. FRONT PANEL FEATURE	4
	4. REAR PANEL FEATURE	6
	5. OPERATING CHARACTERISTICS	7
	5-1. Frequency Measurement	7
	5-2. Period Measurement	7
	5-3. Totalize Measurement	8
	5-4. Check Mode	8
<b>3</b>	<b>CALIBRATION</b>	<b>9</b>
	1. INTRODUCTION	9
	2. TEST INSTRUMENTS REQUIRED	9
	3. TIME BASE FREQUENCY ADJUSTMENT	9
	4. TRIGGER LEVEL ADJUSTMENT	10
<b>4</b>	<b>SERVICING</b>	<b>11</b>
	1. PARTS LIST	11
	2. BLOCK DIAGRAM	17
	3. CIRCUIT DIAGRAM	18

# SECTION 1

## INTRODUCTION & SPECIFICATION

### 1. INTRODUCTION

This instrument is a 10Hz to 1000MHz multi-function counter.

It features a eight digit, high bright seven segment LED display, four function performance, low power consumption circuit design, small size, light weight, high stabilized crystal oven oscillator for measurement accuracy and full input signal conditioning.

The four functions are frequency, period, totalize and self check.

This is accomplished by a single LSI integrated circuit. The input signal can be conditioned by attenuation.

The location of controls, indicators, connectors and all of information for this model are provided in this manual. It is recommended that whole information and details should be read and understood before attempting to operate the instrument for correct operation and best results.

### 2. SPECIFICATIONS

The pertinent specifications are listed as follows ;

#### A. Measuring Mode

Frequency measurements

##### CHANNEL A.

Range	: 10Hz to 10MHz direct counter 10MHz to 100MHz prescaled by 10
Resolution	: Direct counter : 1,10, 100Hz switch selectable. Prescaled : 10, 100, 1000Hz switch selectable.
Gate time	: 0.01S, 0.1S, 1S Switch selectable.
Accuracy	: $\pm 1$ count $\pm$ time base error x frequency.

##### CHANNEL B.

Range	: 100MHz to 1GHz
Resolution	: 100Hz, 1KHz, 10KHz switch selectable.
Gate time	: 0.027S, 0.27S, 2.7S Switch selectable.
Accuracy	: $\pm 1$ count $\pm$ time base error x frequency.

##### Period measurements (Channel A)

Range	: 10Hz to 2.5MHz
Resolution	: $10^{-7}$ S, $10^{-8}$ S, $10^{-9}$ S switch selectable.
Accuracy	: $\pm 1$ count $\pm$ time base error x period

##### Totalize measurements (Channel A)

Range	: 10Hz to 10MHz
Resolution	: $\pm 1$ count of input.

## B. Input Characteristics

### CHANNEL A.

Input sensitivity	: 10MHz Range	: 10Hz ~ 80MHz 25mVrms 8MHz ~ 10MHz 50mVrms
	100MHz Range	: 10MHz ~ 80MHz 25mVrms 80MHz ~ 100MHz 50mVrms
Attenuation	: x1, x20 fixed	
Filter (CHA ONLY)	: Low pass ~ 100KHz, -3dB ~ 150KHz, -3dB at 20dB ATT	
Impedance	: approx. 1M ohm less than 35pF	
Maximum voltage without damage	: 250V (DC + AC rms)	

### CHANNEL B.

Input sensitivity	: 20mVrms
Impedance	: approx. 50 ohm
Maximum voltage without damage	: 3V (DC + AC rms)

## C. Time Base

Frequency	: 10MHz, 3.90625MHz (oven)
Short Term Stability	: $\pm 3 \times 10^{-9}$ (1S average)
Long Term Stability	: $\pm 2 \times 10^{-6}$ /month
Temperature Stability	: $\pm 1 \times 10^{-6}$ (0° C to 40° C)
Line Voltage Stability	: $\pm 1 \times 10^{-7}$ (10% change)

## D. General

Display	: 8 digits, 7mm red LED display with decimal point, gate, overflow, KHz, MHz and $\mu s$ indication.
Check	: Counts internal 10MHz time base oscillator.
Power requirement	: 100/120/220/230V $\pm 10\%$ 50Hz/60Hz
Warm-up time	: 20 minutes when cold started at 25° C
Temperature	: Rated range of use : -5° C ~ +50° C Storage and transport : -40° C ~ +60° C
Humidity	: Operating : 10 ~ 90% RH storage : 5 ~ 95% RH
Demension and Weight	: Width : 253mm Height : 95mm Depth : 280mm Weight : 2,030g

**E. Supplied Accessories** : Power cord  
Operating Manual

**F. Optional Accessories** : BNC to BNC Lead, 50 ohm, 100cm  
BNC to Alligator clip Lead, 50ohm, 100cm

## SECTION 2 OPERATION

### 1. INTRODUCTION

This section provides complete operating information needed for this multifunction counter. This section includes a description of all front panel controls, connectors, indicators, operating instructions and operator's maintenance.

### 2. PREPARATION FOR USE

#### 1) Power Requirements.

It requires a power source of 100, 120, 220, 230 Volts AC, 50Hz/60Hz  
Power consumption is 13W maximum.

#### 2) Line Voltage Selection.

Line voltage selection is determined by the position of the line voltage selector switch located on the rear panel. Line voltage is preset at the factory for the voltage as ordered by the customer.

3) Wait about 20 minutes for correct measurement until the crystal oven oscillator gets stable in aging.

### 3. FRONT PANEL FEATURES

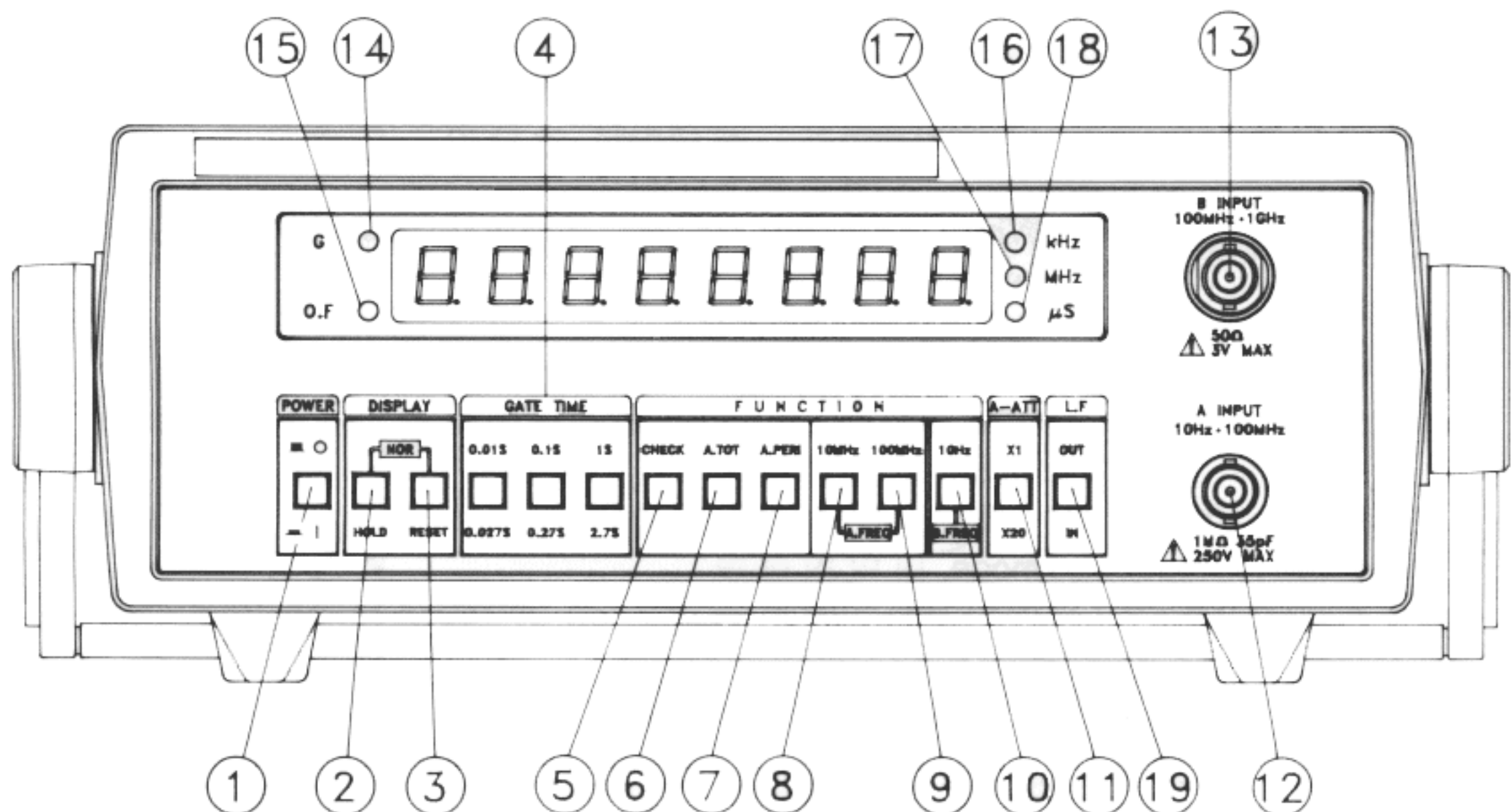


Fig. 2-1. Front Panel

- 1) Power switch : To turn on, press the push-button. To turn off, again press the push-button.
- 2) HOLD : In HOLD state (switch in), the measurement (except for totalize) in progress is stopped.
- 3) RESET : When pressed, The display of the counter becomes "0" immediately to begin new measurement. Usually used in the totalize mode.
- 4) GATE TIME : For frequency measurement, this switch is used to change gate time. When in the period measurement mode, it is used to change the multiplier factors. Each range is as follows ;

CHANNEL A INPUT MODE

FREQUENCY RESOLUTION

GATE TIME	10MHz range	100MHz range
0.01S	100MHz resolution	1KHz resolution
0.1S	10Hz resolution	100Hz resolution
1S	1Hz resolution	10Hz resolution

PERIOD RESOLUTION

GATETIME	Resolution
0.01S	$10^{-7}$ S
0.1S	$10^{-8}$ S
1S	$10^{-9}$ S

CHANNEL B INPUT MODE

GATE TIME	Resolution
0.027S	10KHz
0.27S	1KHz
2.7S	10Hz

- 5) CHECK : When pressed, Counts internal 10MHz time base oscillator.
- 6) A. TOT. : Totalizer measurement.
- 7) A. PERI. : With this switch in, placed in period mode.
- 8) A. FREQ. 10MHz : With this switch in, placed in 10MHz range frequency mode.
- 9) A. FREQ. 100MHz : With this switch in, placed in 100MHz range frequency mode.
- 10) B. FREQ, 1GHz : With this switch in, placed in 1GHz range frequency mode.
- 11) ATT : Input signal attenuator switch.  
When pressed, the sensitivity is attenuated by a factor 20 for input signal.
- 12) A. INPUT : Channel A input BNC connector  
Put a signal in to measure 10Hz ~ 100MHz frequency, period and totalize.



- 13) B. INPUT : Channel B input BNC connector.  
Put a signal in to measure 100MHz ~ 1GHz frequency.
- 14) GATE indicator : Displays the opened or closed state of the GATE.  
When GATE is open, indicator is lit.
- 15) OVERFLOW indicator : Flickers when an input frequency is overflow.
- 16) KHz annunciator : Displays frequency unit (KHz)
- 17) MHz annunciator : Displays frequency unit (MHz)
- 18)  $\mu s$  annunciator : Displays period unit ( $\mu s$ ).
- 19) Low pass Filter : ~ 100KHz, -3dB  
~ 150KHz, -3dB at 20dB ATT

#### 4. REAR PANEL FEATURES

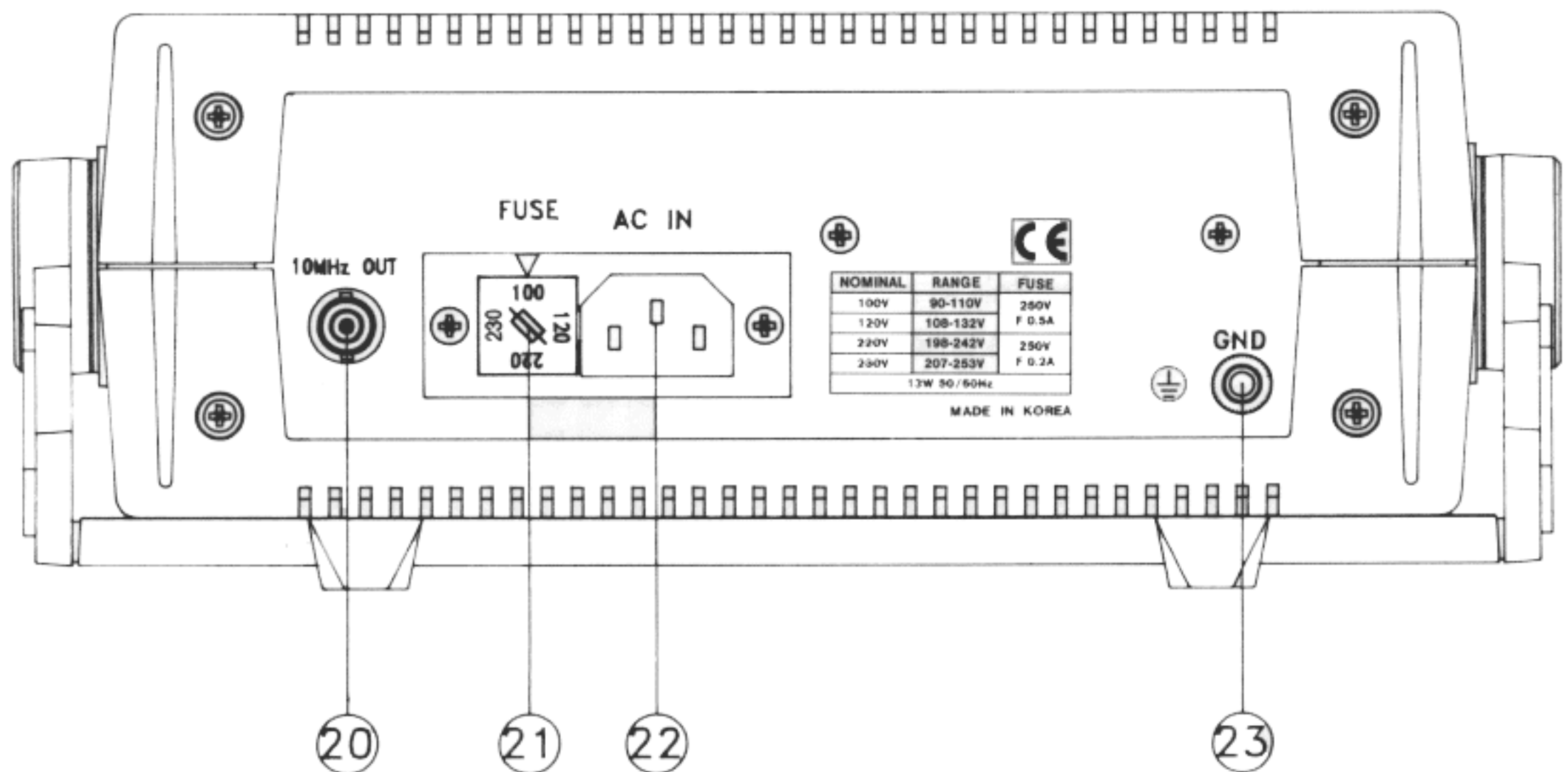


Fig. 2-2. Rear Panel.

- 20) 10MHz OUT : Output connector for internal reference oscillator.  
This connector provides a 10MHz signal.  
It may be used as a reference signal for other frequency counters. When this output signal (10MHz) is used, it is always terminated by 50ohms.
- 21) VOLTAGE SELECTOR : Selects the AC line voltage.
- 22) AC INPUT : Provides connection to AC power.
- 23) GND TERMINAL

\* This instrument is Installation Category (Over voltage Category) : II

## 5. OPERATING CHARACTERISTICS

The following paragraphs describe the operating ranges and resolution for frequency, period, totalize and check function.

### 5-1. Frequency Measurement

Perform frequency measurement as follows

- 1) Press the POWER switch to the ON position.
- 2) Press the FREQ. switch to select the frequency mode of operation.
- 3) Select the desired gate time.
- 4) Connect the input signal to the front-panel BNC connector.
- 5) Set ATT. to desired position. If input signal level is greater than 300mV, pressing the ATT. switch will decrease the triggering sensitivity of the input section by a 20 and reduce errors.
- 6) Read the frequency on display, and observe the unit of measurement indication to the right of the display.

### 5-2. Period Measurement

Perform period measurement as follows :

- 1) Press the POWER switch to the ON position.
- 2) Press the A. PERI switch to select the period mode of operation.
- 3) Select the desired PERI MULTI.
- 4) Connect the input signal to the front-panel A. INPUT BNC connector.
- 5) Set ATT. to desired position. If input signal level is greater than 300mV, pressing the ATT. switch will decrease the triggering sensitivity of the input section by a 20 and reduce errors.
- 6) Read the period time on display, and observe the unit of measurement indication to the right of the display.

### 5-3. Totalize Measurement

Perform totalize measurement as follows :

- 1) Press the POWER switch to the ON position.
- 2) Press the A. TOT switch to select the totalize mode of operation, and the RESET switch to initialize the counter.
- 3) Connect the input signal to the front-panel A. INPUT BNC connector.
- 4) Set ATT. to desired position. If input signal level is greater than 300mV, pressing the ATT. switch will decrease the triggering sensitivity of the input section by a 20 and reduce errors.
- 5) Read the accumulated total on display after HOLD switch in.

### 5-4. Check Mode.

The self-check mode provides a means of verifying proper overall operation of counter, including input section, time base accuracy, and time base dividers used in the period mode.

- 1) Press the POWER switch to the ON position.
- 2) Press the check switch to select the self-check mode.
- 3) Press the 1S GATE TIME selector ; the display should read  
10000.000  
with the instrument gating once every second.
- 4) Press the 0.1S GATE TIME selector ; the display should read  
10000.00  
with a 100-millisecond gate time.
- 5) Press the 0.01S GATE TIME selector ; the display should read  
10000. 0  
with a 10-millisecond gate time.

## SECTION 3 CALIBRATION

### 1. INTRODUCTION

Calibration is limited to adjustment of the time base oscillator frequency and the trigger level.

Time base oscillator adjustment should be made whenever the oscillator is repaired or whenever it is determined that accuracy of the counter is not within the accuracy desired. Perform time base oscillator adjustment in an environment having an ambient temperature of +22° C to +25° C (72° F to 77° F). Allow the instrument to warm up at least 30 minutes with case on before adjusting the time base.

#### WARNING

**MAINTENANCE DESCRIBED HEREIN IS PERFORMED WITH POWER SUPPLIED TO THE INSTRUMENT, AND PROTECTIVE COVERS REMOVED. SUCH MAINTENANCE SHOULD BE PERFORMED ONLY BY SERVICE-TRAINED PERSONNEL WHO ARE AWARE OF THE HAZARD INVOLVED (FOR EXAMPLE, FIRE AND ELECTRICAL SHOCK). WHERE MAINTENANCE CAN BE PERFORMED WITHOUT POWER APPLIED, THE POWER SHOULD BE REMOVED.**

### 2. TEST INSTRUMENTS REQUIRED

INSTRUMENT	Brief specification
1) Quarts oscillator	Range : 10MHz, 1GHz Temperature coefficient : $\pm 1 \times 10^{-6}$
2) Sine wave generator	Range : 1KHz ~ 1GHz

### 3. TIME BASE FREQUENCY ADJUSTMENT

#### A. Time Base

- 1) Remove the counter from the case.
- 2) Select a 10 MHz output on the quarts oscillator (i.e., house standard) and connect the 10MHz signal to the counter A. INPUT
- 3) Set the front panel controls as follow :

POWER .....	ON
NOR/HOLD .....	NOR
GATE TIME .....	1S
FUNCTION .....	A. FREQ. 10MHz
ATT .....	x1

The approximate input frequency should be in the display with an update once a second.

- 4) While observing the counter display, adjust the time base oscillator control (C25 located on the oven) to obtain a reading of 10000.000  $\pm$  1digit.

## B. Time Base

- 1) Remove the counter from the case.
- 2) Select a 1GHz output on the quartz oscillator (i.e., house standard) and connect the 1GHz signal to the counter B. INPUT.
- 3) Set the front panel controls as follow :

POWER .....	ON
NOR/HOLD .....	NOR
GATE TIME .....	2.7S
FUNCTION .....	B. FREQ. 1GHz
ATT .....	x1

The approximate input frequency should be in the display with an update once a 2.7S.

- 4) While observing the counter display, adjust the time base oscillator control (C28 located on the oven) to obtain a reading of  $1000.0000 \pm 1$  digit.

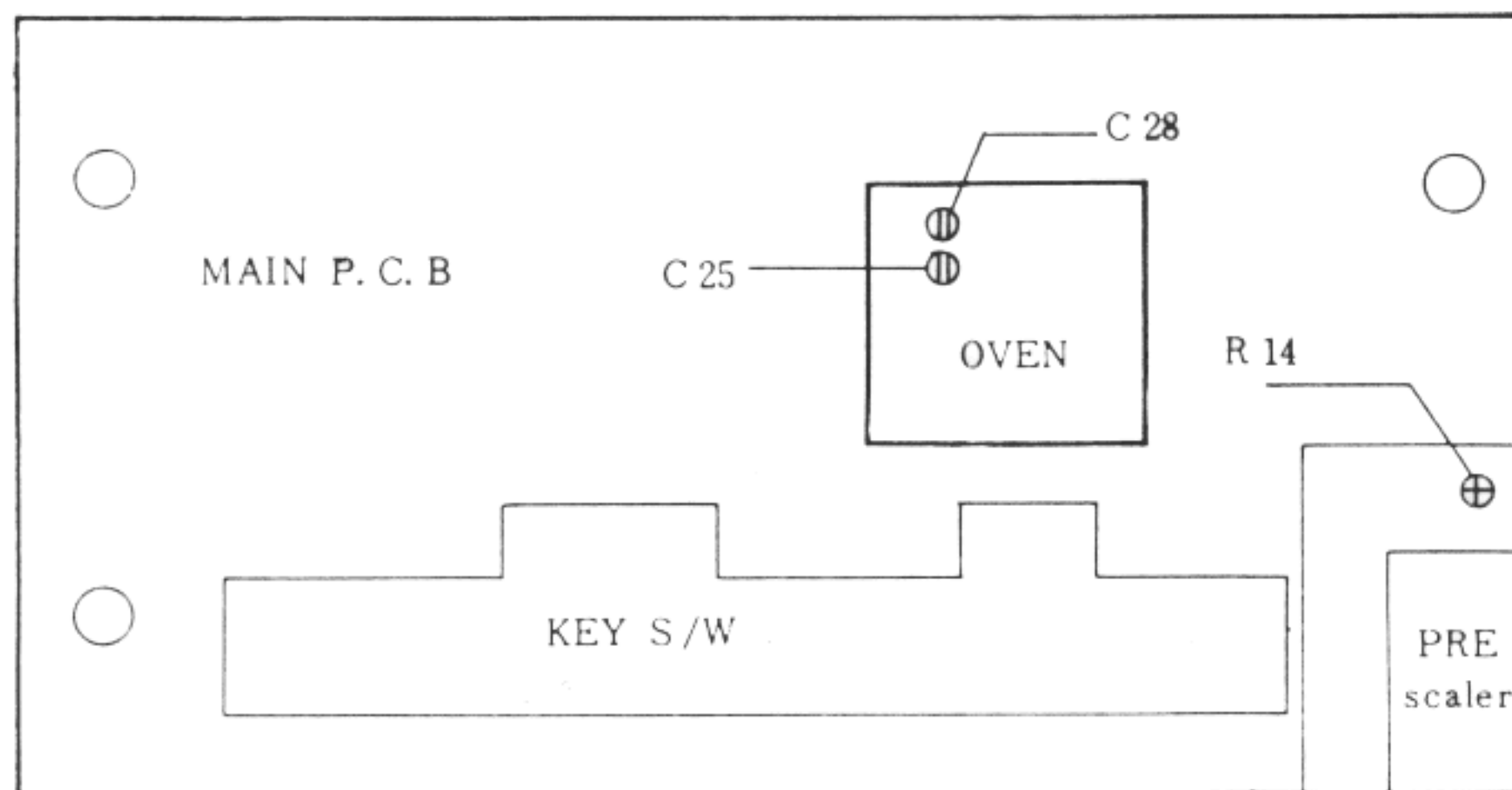
## 4. TRIGGER LEVEL ADJUSTMENT

- 1) Remove the counter from the case.
- 2) Set sine wave generator controls for 10MHz at exactly 25mV rms amplitude.
- 3) Connect generator to A. INPUT connector of the front panel.
- 4) Set the front panel controls as follow :

POWER .....	ON
NOR/HOLD .....	NOR
GATE TIME .....	1S
FUNCTION .....	A. FREQ. 10MHz
ATT .....	x1

The approximate input frequency should be in the display with an update once a second.

- 5) While observing the counter display, adjust the trigger level control (R14 located on the P. C. B.) to obtain a reading of stable value.



**Fig. 3-1.** Position of Adjustments

## SECTION 4 SERVICING

### 1. PARTS LIST

CODE-NO	PARTS NAME	SPEC (DESCRIPTION)	UNIT	Q'TY	REF-NO
2-A10-867	DISPLAY PCB ASS'Y	9100 (HC)	KIT	1	
2-C02-015	LED	KL-R34D [KWANG YOUNG]	EA	5	L1,2,3,4,5
2-C02-185	SEVEN SEGMENT	SND 410AR [SAM KWANG]	EA	8	LD1,2,3,4,5,6,7,8
2-C43-326	DISPLAY PCB	9100D-1 [KWANG JIN]	EA	1	
2-C21-474	TRAP CONNECTORS	9200-09V [SUNG HEUNG]	EA	1	
2-C21-473	TRAP CONNECTORS	9200-12V [SUNG HEUNG]	EA	1	
2-A10-868	MAIN PCB ASS'Y	9100 (HC)	KIT	1	
2-C28-198	CERAMIC CAPACITOR	0.1UF 50V M (DD380749F104M50V) [NKE]	EA	1	C3
2-C28-272	CERAMIC CAPACITOR	18PF 50V J (DD340CH180J50) [SHIN HAN]	EA	1	C37
2-C28-187	CERAMIC CAPACITOR	220PF 500V J (DH12RH221J500V) [MURATA]	EA	1	C0
2-C33-242	CERAMIC CAPACITOR	22PF 50V J (DD340CH220J50) [SHIN HAN]	EA	1	C10
2-C28-282	CERAMIC CAPACITOR	39PF 50V J (DD350749C390J50V) [SHIN HAN]	EA	1	C34
2-C28-266	CERAMIC CAPACITOR	47PF 50V J (DD350CH470J50) [SHIN HAN]	EA	2	C11,12
2-C28-269	CERAMIC CAPACITOR	68PF 50V J (DD360CH680J50) [SAIN HAN]	EA	1	C36
2-C33-035	ELECTROLYTIC CAPACITOR	2200UF 25V M (SMS1EV222M) [SAM YOUNG]	EA	1	C32
2-C33-107	ELECTROLYTIC CAPACITOR	3.3UF 50V (SMS1HVB3R3M) [SAM YOUNG]	EA	5	C14,22,4,6,9
2-C33-123	ELECTROLYTIC CAPACITOR	470UF 25V M (SMS1EV471M) [SAM YOUNG]	EA	1	C30
2-C33-050	ELECTROLYTIC CAPACITOR	47UF 25V M (SMS1EV470M) [SAM YOUNG]	EA	1	C7
2-C31-019	METALIZED FILM CAPACITOR	0.1UF 63V J (MMY168-104J63V) [YUCHANG]	EA	9	C13,20,21,23,29,31 33,35,8
2-C31-076	METALIZED FILM CAPACITOR	0.47UF 400V K (MMY100474K400V)	EA	1	C1
2-C30-020	TANTAL CAPACITOR	22UF 25V M (SMS-BP-D 1EVB 220M)	EA	1	C5
2-C02-004	DIODE	1N 4148 [F.C]	EA	9	D1,10,11,2,5,6,7,8,9
2-C03-007	DIODE	W02 [DIODE INC]	EA	1	BR
2-C02-018	FET	J310 [SILICONIX]	EA	1	Q1
2-C04-001	IC	ICM 7226 BIPL [HARRIS]	EA	1	U6
2-C04-002	IC	MC 10216 P [MOTOROLA]	EA	1	U1
2-C46-416	IC	MC 74HC04 BCP [MOTOROLA]	EA	1	U7
2-C05-020	IC	MC 7805 CT [MOTOROLA]	EA	1	U8

CODE-NO	PARTS NAME	SPEC (DESCRIPTION)	UNIT	Q'TY	REF-NO
2-C21-134	IC	SN 74LS00 N [T.I]	EA	2	U4, 5
2-C04-004	IC	UPB 551 C [N.E.C]	EA	1	U2
2-C43-337	MAIN PCB	9100-1 [KWANG JIN]	EA	1	
2-C11-004	CERAMIC FILM RESISTOR	1.5K OHM 1/4W J (RD14BY2E152J)	EA	4	OR1, R22, 23, 53
2-C10-008	CERAMIC FILM RESISTOR	10 OHM 1/4W J (RD14BY2E100J)	EA	1	R8
2-C10-022	CERAMIC FILM RESISTOR	100 OHM 1/4W J (RD14BY2E101J)	EA	1	R30
2-C11-044	CERAMIC FILM RESISTOR	100K OHM 1/4W J (RD14BY2E104J)	EA	1	R40
2-C11-023	CERAMIC FILM RESISTOR	10K OHM 1/4W J (RD14BY2E103J)	EA	7	R39, 41, 42, 43, 44, 47, 51
2-C11-001	CERAMIC FILM RESISTOR	1K OHM 1/4W J (RD14BY2E102J)	EA	6	R15, 16, 45, 48, 58, 9
2-C18-051	CERAMIC FILM RESISTOR	1M OHM 1/4W J (RD14BY2E105J)	EA	2	R54, 56
2-C18-018	CERAMIC FILM RESISTOR	220 OHM 1/4W J (RD14BY2E221J)	EA	1	R6
2-C18-019	CERAMIC FILM RESISTOR	260 OHM 1/4W J (RD14BY2E261J)	EA	1	R31
2-C18-022	CERAMIC FILM RESISTOR	360 OHM 1/4W J (RD14BY2E361J)	EA	1	R29
2-C18-039	CERAMIC FILM RESISTOR	4.7K OHM 1/4W J (RD14BY2E42J)	EA	1	R0
2-C18-024	CERAMIC FILM RESISTOR	470 OHM 1/4W J (RD14BY2E471J)	EA	10	R17, 18, 20, 21, 27, 28, 46, 49, 50, 52
2-C18-025	CERAMIC FILM RESISTOR	510 OHM 1/4W J (RD14BY2E511J)	EA	1	R5
2-C10-037	CERAMIC FILM RESISTOR	560 OHM 1/4W J (RD14BY2E561J)	EA	2	R19, 25
2-C10-038	CERAMIC FILM RESISTOR	680 OHM 1/4W J (RD14BY2E681J)	EA	1	R24
2-C18-084	METAL FILM RESISTOR	1.62K OHM 1/4W F (RN14BK2E1621F)	EA	1	R13
2-C15-022	METAL FILM RESISTOR	1M OHM 1/2W F (RN14BK2H1004F)	EA	2	R1, 4
2-C18-063	METAL FILM RESISTOR	237 OHM 1/4W F (RN14BK2E2370F)	EA	1	R11
2-C18-065	METAL FILM RESISTOR	261 OHM 1/4W F (RN14BK2E2610F)	EA	1	R10
2-C18-097	METAL FILM RESISTOR	50K OHM 1/4W F (RN14BK2E5002F)	EA	1	R2
2-C03-056	IC SOCKET	40PIN	EA	1	
2-C39-238	PUSH INTERLOCK SWITCH	9100 [ITT]	EA	1	
2-C01-010	TR	2N 2222 (NPN) [MOTOROLA]	EA	3	Q7, 8, 9
2-C01-004	TR	BC 327 [THOMSON]	EA	2	Q3, 4
2-C34-011	SEMI FIXED RESISTOR	20K OHM B (092TYPE)	EA	1	R14

CODE-NO	PARTS NAME	SPEC (DESCRIPTION)	UNIT	Q'TY	REF-NO
2-C29-018	SEMI FIXED RESISTOR	470 OHM B (RH 1051CSJ141A) [ALPS]	EA	1	R32
2-C21-464	CONNECTOR WAFER	LW 1143-02 [HANLIM]	EA	1	P4
2-C21-478	CONNECTOR WAFER	YW 025-03 [YEONHO]	EA	2	P1,2
2-C21-479	CONNECTOR WAFER	YW 025-04 [YEONHO]	EA	1	P3
2-C24-042	ECOONO-CABLE	9100-01 (88102-09B) [SUNG HEUNG]	EA	1	JP2
2-C24-043	ECOONO-CABLE	9100-02 (88102-12H) [SUNG HEUNG]	EA	1	JP1
2-C37-063	HEAT SINK	LF100 (AL T1.5)	EA	1	
2-T11-026	HEXAGON NUT	M3 NI/PL	EA	3	
2-C37-067	PCB SHILED PLATE	LF1000 (B-04-P159)	EA	1	
2-T06-011	HEXAGON POLE	LF1000 (B-04-R035-1)	EA	3	
2-C42-136	SILICON RUBBER (1)	ARH 230 (T0.3*13*18) [APLX]	EA	1	
2-T48-015	MACHINE SCREW	BH(+) M2.0*6.0 NI/PL	EA	3	
2-T10-015	MACHINE SCREW	BH(+) M3.0*8.0 NI/PL	EA	3	
2-A10-869	OVEN PCB ASS'Y	9100 (HC)	KIT	1	
2-C34-054	MICA CAPACITOR	33PF 50V J (FM05ZC330J50V) [SANG SHIN]	EA	1	C26
2-C34-053	MICA CAPACITOR	43PF 50V J (FM07ZC430J50V) [SANG SHIN]	EA	1	C24
2-C34-052	MICA CAPACITOR	50PF 50V J (FM07ZC500J50V) [SANG SHIN]	EA	1	C27
2-C34-130	TRIMMER CAPACITOR	20PF (CV05C2003) [CHUN NIL]	EA	2	C25,28
2-C32-040	CRYSTAL	10MHZ (5PPM) [N.D.K]	EA	1	
2-C32-039	CRYSTAL	03.90625MHZ (5PPM) [N.D.K]	EA	1	
2-C43-040	OVEN PCB	OVEN (T)	EA	1	
2-C10-001	JUMP RESISTOR	0 OHM 1/4W (METAL TYPE)	EA	1	OR1
2-C30-026	CURRENT LIMITTER	1K OHM 6MM 8MA	EA	1	OTH1
2-C01-009	TR	TIP 31C	EA	1	OQ1
2-C21-039	CONNECTOR WAFER	TFWP 0640-02A (5MM)	EA	1	
2-C21-040	CONNECTOR WAFER	TFWP 0640-05-5MM	EA	1	
2-C37-066	OVEN COVER	8100A (B-04-P160)	EA	1	
2-C37-087	HEAT SINK	X-TAL HEAT SINK(PBSR-H)	EA	1	
2-T11-026	HEXAGON NUT	M3 NI/PL	EA	1	



CODE-NO	PARTS NAME	SPEC (DESCRIPTION)	UNIT	Q'TY	REF-NO
2-T10-015	MACHINE SCREW	BH(+) M3.0*8.0 NI/PL	EA	1	
2-A10-870	TRIPRESCALER PCB ASS'Y	9100 (HC)	KIT	1	
2-C33-088	CERAMIC CAPACITOR	0.001UF 50V K (DD804B102K50) [MURATA]	EA	3	C1, 2, 3
2-C33-102	ELECTROLYTIC CAPACITOR	10UF 6.3V (SRA6.3VB10M) [SAM YOUNG]	EA	1	C5
2-C28-048	SEMI CONDUCTOR CERAMIC CAP	0.01UF 25V Z (BD050YU-103Z25V) [YUKO]	EA	1	C4
2-C28-091	SEMI CONDUCTOR CERAMIC CAP	0.1UF 25V M (BD070YU104M25) [YUKO]	EA	2	C6, 7
2-T06-007	BNC CONNECTOR	UG-1000/U	EA	1	
2-C02-004	DIODE	1N 4148 [F.C]	EA	2	D1, 2
2-C04-058	IC	MB 506 [FUSITHU]	EA	1	IC1
2-C46-106	IC	TC 74HC 04AP [TOSHIBA]	EA	1	IC2
2-C43-044	PRESCALER PCB	PRS-1000 (01-068-05)	EA	1	PCB
2-C20-087	CARBON FILM RESISTOR	10K OHM 1/8W J (RD14BY2B103J)	EA	2	R3, 4
2-C20-099	CARBON FILM RESISTOR	1K OHM 1/8W J (RD14BY2B105J)	EA	2	R5, 7
2-C20-107	CARBON FILM RESISTOR	2.2K OHM 1/8W J (RD14BY2B222J)	EA	1	R2
2-C19-049	CARBON FILM RESISTOR	22M OHM 1/8W J (RD14BY2B226J)	EA	1	R6
2-C20-192	CARBON FILM RESISTOR	51 OHM 1/8W J (RD14BY2B510J)	EA	1	R1
2-C26-160	CONNECTOR LEAD WIRE	9100-03	EA	1	CN1
2-T06-006	PRESCALER CASE	LF1000 (SPTTE T0.3)	EA	1	
2-T06-005	PRESCALER SHIELD COVER	SPTTE T0.3 (LF1000)	EA	1	
2-B10-261	FRONT PANEL ASS'Y	9100 (HC)	KIT	1	
2-T01-001	BNC CONNECTOR	UG-625/U [MOCK SUNG]	EA	1	J1
2-C26-161	CONNECTOR LEAD WIRE	9100-04	EA	1	J1
2-T07-346	FRONT PANEL	9100 (SECC T1.2: B-03-P195)	EA	1	
2-T10-143	MACHINE SCREW	BH(+) M3.0*6.0 NI/PL	EA	2	
2-B10-262	REAR PANEL ASS'Y	9100 (HC)	KIT	1	
2-T01-001	BNC CONNECTOR	UG-625/U [MOCK SUNG]	EA	1	
2-C43-582	FUSE	250V F 200mA	EA	1	
2-C40-058	AC INLET	BAC1-01	EA	1	
2-C40-018	1KEY PUSH-PUSH SWITCH	SPL208K-1D	EA	1	

CODE-NO	PARTS NAME	SPEC (DESCRIPTION)	UNIT	Q'TY	REF-NO
2-C39-237	POWER TRANSFORMER	9010,9100 [YANG WON]	EA	1	
2-T18-029	HEAT SINK TUBE	4PI	EA	1	
2-C26-162	CONNECTOR LEAD WIRE	9010-05	EA	1	
2-C26-016	GROUND LEAD WIRE	1000LF 05	EA	1	
2-C26-167	LEAD WIRE	9100-06	EA	1	
2-C26-168	LEAD WIRE	9100-07	EA	1	
2-T06-013	TRANSFORMER BRACKET	G-205 (SPC T1.0 ZN/PL)	EA	1	
2-T11-029	HEXAGON NUT	M6 NI/PL	EA	1	
2-T08-074	REAR APNEL	9100 (L-SHEET T1.0 SB-142L: B-03-P176)EA	EA	1	
2-T10-015	MACHINE SCREW	BH(+) M3.0*8.0 NI/PL	EA	2	
2-T53-106	MACHINE SCREW	FH(+) M3.0*8.0 NI/PL	EA	2	
2-T01-021	GROUND TERMINAL	5500 (BSBM NI/PL C310303)	EA	1	
2-T02-031	CABLE TIE	100MM (SMALL AN-1)	EA	2	
2-T11-018	TOOTHED LOCK WASHER	6PI ZN/PL (INSIDE)	EA	1	
2-Z10-280	LINE ASS'Y	9100 (HC)	KIT	1	
2-C43-582	FUSE	250V F 200mA	EA	1	
2-T05-093	POWER SWITCH BAR	9100 (SUS 304 PI2.0: B-02-P226)	EA	1	
2-T23-280	HANDLE BRACKET	9204C (ABS H2756: B-03-M164)	EA	2	
2-T23-281	HANDLE FIX BRACKET	9204C (SECC T1.2: B-03-P183)	EA	2	
2-C37-140	POWER SWITCH BRACKET	SECC T2.0 (B-04-P178-1)	EA	1	
2-T08-070	CASE	9204C (ABS H1425TV, H2715: B-01-M162)EA	EA	2	
2-T07-318	FRONT COVER	9204C (ABS H2756: B-02-M161)	EA	1	
2-T07-136	SHIELD COVER	F1000 (SPTTE 0.3T)	EA	1	
2-T02-067	RUBBER FOOT	9204C (BUMPON, SJ-5514, BLACK)	EA	4	
2-T07-315	FRAME	9204C (SECC T1.2: B-03-P177)	EA	2	
2-T18-049	SHAFT GUIDE	ABS BLACK (B-04-M167)	EA	1	
2-T18-051	SWITCH BAR GUIDE	9205C (ACINLET: B-04-P225)	EA	1	
2-T08-069	HANDLE	9204C (ABS H2756: B-03-M163)	EA	1	
2-T21-010	KNOB (8)	5502(HC) (HANNAM ABS 750, GRAY)	EA	1	

CODE-NO	PARTS NAME	SPEC (DESCRIPTION)	UNIT	Q'TY	REF-NO
2-T07-347	TOP PLATE	9100 (HC: BT9100-001)	EA	1	
2-T58-033	SHILED POLE	Z216 (BSBM 5*5)	EA	4	
2-T48-015	MACHINE SCREW	BH(+) M2.0*6.0 NI/PL	EA	3	
2-T10-143	MACHINE SCREW	BH(+) M3.0*6.0 NI/PL	EA	2	
2-T19-066	TAPPING SCREW	BH(+) PI3.0*6.0 NI/PL H/T 2PART	EA	10	
2-T54-325	TAPPING SCREW	BH(+) PI4.0*8.0 ZN/PL 1PART	EA	2	
2-T54-201	WASHER WITH MACHINE SCREW	PH(+) M3.0*6.0 NI/PL	EA	4	
2-T07-317	SHILED PLATE(2)	9204C (XPC T1.0 NI/PL: B-03-P194)	EA	1	
2-Z50-194	PACKING ASS'Y	9100 (HC)	KIT	1	
2-T14-019	COXTAL CABLE	BNC-TO-CLIP 100CM (RG58)	EA	1	
2-T27-004	AC POWER CORD	M-117 (U.L)	EA	1	
2-C43-582	FUSE	250V F 200mA	EA	1	
2-T08-043	HANDLE PLATE	H.C (PC TO.3)	EA	1	
2-T22-369	NAME PLATE	9100 (HC: BN9100-001)	EA	1	
2-T59-115	INNER BOX	BENCH(NEW) (395*300*164:FOR EXPORT)	EA	1	
2-T07-091	OUT BOX	BENCH(NEW) (630*420-400:FOR EXPORT)	EA	0.25	
2-T14-042	SNOW BOX	8010A (FRONT/REAR)	EA	1	
2-T14-253	MANUAL	9100 (HC) (ENGLISH: BM9100-001)	EA	1	
2-T14-012	POLY BAG	0.1*500*350	EA	1	
2-T14-013	POLY BAG	5.5*8 (ZIPPER)	EA	1	
2-T52-003	SILICA GEL	5/G	EA	2	
2-T15-162	BOX STICKER	9100 (HC: BBS9100-001)	EA	1	
2-C43-575	FUSE	250V F 0.5A	EA	1	

## 2. BLOCK DIAGRAM

