



# MITSUBISHI

## F<sub>2</sub> PC Quick Reference Guide

### Base Units

Device	F <sub>2</sub> -20M	F <sub>2</sub> -40M	F <sub>2</sub> -80M
Inputs X	12 (400-413)	24 (400-413) (500-513)	36 (000-013) (400-413) (500-513)
Outputs Y	8 (430-437)	16 (430-437) (530-537)	24 (030-037) (430-437) (530-537)
Timer T .1 (.1-999)		24 (050-057) (450-457) (550-557)	
Timer T .01 (.01-99.9)		8 (650-657)	
Counter* C (0-± 999)		32 (060-067) (460-467) (560-567) (660-667)	
High Speed Counter* (0-± 999999)		1 Maximum 2 kHz C661-Upper 3 BCD Digits C660-Lower 3 BCD Digits	
Internal Relays M		128 (100-177) (200-277)	
Latch Relays* M		64 (300-377)	
Special Use Relays M		24 (070-077) (470-477) (570-577)	
State* S		168 (600-647) (800-877) (900-977)	
Data Registers* D		64 (700-777) Also used as Jump Labels	
Special Function F		8	
		F670 Function Number	
		F671-675 Function Parameters	
		F676 Undefined	
		F677 Drum Sequencer	

### Extension Units

Device	F <sub>2</sub> -6EY	F <sub>2</sub> -20E	F <sub>2</sub> -40E	F <sub>2</sub> -80E
Inputs X	-	12 (□14-□27)	24 (414-427) (514-527)	36 (014-027) (414-427) (514-527)
Outputs Y	8 (□40 □47)	8 (□40 □47)	16 (440-447) (540-547)	24 (040-047) (440-447) (540-547)

□ - 0, 4, 5 Depending on Base Unit Used

### Special Use Relays

○ Use As Contact • Use As Coil

M070	○	Run Contact	
M071	○	Run One-Shot	
M072	○	100ms Clock (50ms On, 50ms Off)	
M073	○	10ms Clock (5ms On, 5ms Off)	
M074	○	Link Interruption	
M075	○	Link Failure	
M076	○	Battery Low	
M077	•	Prohibit Output (On-Prohibit Off-Enable)	
M470	•	External/Internal Counter On-External Off-Internal	C660, or C660 & C661
M471	•	Up/Down Direction (External) On-Up Off-Down	
M472	•	Count Signal (External) On-Enable Counting Off-Disable Counting	
M473	○	Count = Preset (External)	
M474	•	Count Up/Down Mode (Internal) On-Up/Down Mode Off-Down Only	ALL COUNTERS
M475	•	Count Up/Down Direction (Internal) On-Up Off-Down	
M476	○	Count = Preset (Internal)	
M477	•	Shift Register Up/Down Direction On-Up Off-Down	
M570	○	Special Functions Error Flag	
M571	○	Carry Flag	
M572	○	Zero Flag	
M573	○	Borrow Flag	
M574	•	Prohibit State Change On-Prohibit Off-Enable	
M575	•	State Transfer Start	
M576	○	Drum Sequencer Operation Complete	
M577	•	Select C666, C667 As Drum Sequencer	

\*Battery Backed

## Transfer Instructions

Function	K	X, Y, M, S Device	T, C, D	T, C, D	Y, M, S Device
READ	K32		$D_0, D_2$	w/bias BCD 1-3 Digit	Y, M, S
	K35		$R_0, R_2, D$	w/bias BCD 1-3 Digit	Y, M, S
	K37		D	BCD 3 Digit	Y, M, S
	K105		$R_2$	BCD 3 Digit	M260-M273
	K129		$R_0, R_2, D$	BCD 3 Digit	Data I/O Unit
WRITE	K31	X, Y, M, S		w/bias BCD 1-3 Digit	$D_0, D_2$
	K34	X, Y, M, S		w/bias BCD 1-3 Digit	$R_0, R_2, D$
	K36	X, Y, M, S		BCD 3 Digit	D
	K104	M260-M273		BCD 3 Digit	$R_2$
	K117	M240-M273		BCD 3 Digit x 2 Register	D756, D757
	K119	M240-M277		Immediate Output Table	D760-D777
	K126	Data I/O Unit		BCD 3 Digit	$D_0, D_2, D$
	K186	Data I/O Unit		BCD 6 Digit	D & Y, M, S
	K30	K		BCD 3 Digit	$D_0, D_2$
	K33	K		BCD 3 Digit	$R_0, R_2, D$
	K36	K		BCD 3 Digit x N Times	$D_0, D_2, D$
	K27	K		BCD 1-3 Digit	Y, M, S
	K28	K		OCT 3 Digit	Y, M, S
	K109	$K_1, K_2$		BCD 6 Digit	M240-M253 M260-M273
	TRANSFER	K50		$D_0, D_2, D$	BCD 3 Digit
K51			$R_0, R_2, D$	BCD 3 Digit	$R_0, R_2, D$
K39			D	BCD 3 Digit	$D_0, D_2$
				x N Times	D
K52		Specify Internal Registers	(D)	BCD 3 Digit	D
K53			(D)	BCD 3 Digit	(D)
K54			(D)	BCD 3 Digit	(D)
K159		D-Direct	D	BCD 3 Digit	( $D_0, D_2$ )
K160		(D)-Indirect	( $D_0, D_2$ )	BCD 3 Digit	D
K161			( $R_0, R_2$ )	BCD 3 Digit	D
K29	X, Y, M, S		BIN n Bit	Y, M, S	
K133	X, Y, M, S		BIN 8 Bit	Y, M, S	
EXCHANGE	K49		D	BCD 3 Digit	D
	K134	Y, M, S		BIN 8 Bit	Y, M, S
CONVERSION	K131	X, Y, M, S		BCD 3 Digit → BIN 10 BIT	Y, M, S
	K132	X, Y, M, S		BIN 10 BIT → BCD 3 Digit	Y, M, S
	K86			BCD 3 Digit → BIN 8 BIT	Analog Unit
	K85			D BIN 8 Bit → BCD 3 Digit	D
	K98	K	Analog Unit	BCD (0-31) → BIN 5 Bit	Y, M, S
COMPLEMENT	K135	X, Y, M, S		BIN 8 Bit	Y, M, S

## Comparison Instructions

Function	K	X, Y, M, S	$R_0, R_2, D$	$R_0, R_2, D$	X, Y, M, S
K41		X, Y, M, S		w/bias BCD 1-3 Digit	$R_0, R_2, D$
K42		X, Y, M, S		BCD 3 Digit	$R_2, D$
K107		M260-M273		BCD 3 Digit	$R_2$
K45			$R_2, D$	BCD 3 Digit	$R_2, D$
K157			Zone Comparison	BCD 3 Digit	D → Y, M, S Compare Output
K137		X, Y, M, S		BIN 8 Bit	X, Y, M, S
K40	K			BCD 3 Digit	$R_0, R_2, D$
K48	K=0			Check for Register = 0	D
X138	K			Check Octal Constant with 8-Digit Data	X, Y, M, S
K43 (K108)	$K_1, K_2$			Range Check BCD 3 Digit	$R_0, R_2, D$
K44 (K108)	$K_1, K_2, K_3, K_4$			Range Check BCD 6 Digit	$R_2, D$

## Encode/Decode Instructions

X, Y, M, S BIN	K20 (2 → 4)	→	Y, M, S
	K21 (3 → 6)	→	
	K22 (4 → 16)	→	
X, Y, M, S	K23 (4 → 2)	→	Y, M, S BIN
	K24 (8 → 3)	→	
	K25 (16 → 4)	→	
X, Y, M, S	K39 (6 → 64)	→	M, S 0-77 OCT

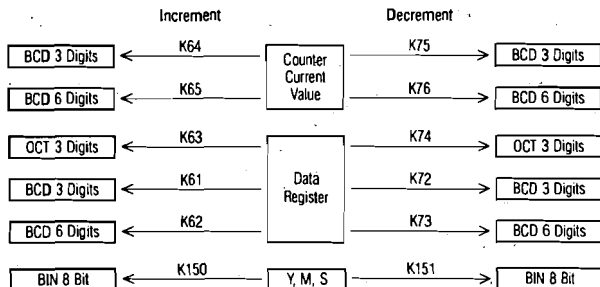
## Logical Math & Binary Math

Instructions	8-BIT With Constant	8-BIT With 8-BIT	
	Function	Function	
LOGICAL	AND K138	K139	
	OR K140	K141	
	XOR K142	K143	
	XNOR K144	K145	
	+	K146	K147
BINARY	-	K148	K149
	x	K152	K153
	-	K154	K155
	Negate	K156	-

## Math Instructions

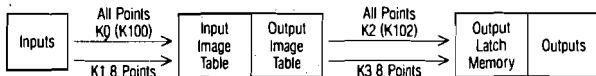
Instructions	D With K	D With D	
	Function	Function	
Octal Add		K50	
Octal Subtract		K71	
3 Digit BCD	+ Without Carry Or Borrow	K47	K57 K68
	+ With Carry and Borrow	K55 K66	K58 K69
6 Digit BCD	+ Without Carry and Borrow	K56 K67	K59 K70
	+ With Carry and Borrow		
3 Digit BCD	x	K77	K79
	-	K81	K83
6 Digit BCD	x	K78	K80
	-	K82	K84

## Increment/Decrement

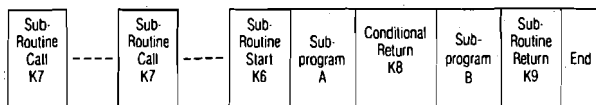


## Immediate Instruction

### I/O Refresh:



## Subroutine Control:

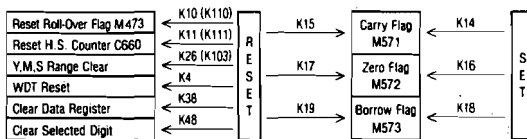


## High Speed Counter Adapter

- K90 : Select External Counter Type
- K91 : Designate 1-Channel, 3/6 Digit
- K92 : Designate 2-Channel Counter
- K116 : Prohibit External Reset
- K118 : Execute Auto-Reload
- K120 : Prohibit Immediate Outputs
- K121 : Permit Immediate Outputs

Description	Instruction	F <sub>2</sub> -40AC	
		Single Channel	Single Channel / Dual Channel
Get External Counter Signal	F670 K12	F670 K90 Not Energized	F670 K90 Energized A, B, Z Valid
Leading-Edge Detection	B CH F670 K112, K113	Valid	Valid
	Z CH F670 K114, K115	Valid	Valid
Pulse Width Measurement	A CH F670 K122	Valid	Valid
	Z CH F670 K123	Valid	Valid
Frequency Measurement	B CH F670 K126	Valid	Valid
	Z CH F670 K127	Valid	Valid
Count Pulses 2 kHz	B CH F670 K124	Valid	Valid
	Z CH F670 K125	Valid	Valid

## Set/Reset Instructions



## Miscellaneous Instructions

### Mode Instructions

- K5 : T. C. Preset Prohibit
- K87 : Select Subtraction Mode
- K93 : Enable Internal Signal Pair Counters
- K97 : Battery Indication Mode

### -Step Ladder Instructions

- K95 : Report Energized Element In Range
- K96 : General STL Sequence

### Miscellaneous Instructions

- K13 : Run/Stop Status
- K88 : Check Range for Valid BCD Data
- K94 : Count Energized Elements in Range
- K130 : Variable Length Shift Register
- K158 : Multiplexed BCD Inputs
- K162 : Read Ten-Key Data
- K163 : Generate Clock Circuit
- K164 : Select Time Rounding Method
- K165 : Rotary Control Circuit

# Program Mode (PC: 1K/2K)—Stopped Select F<sub>1</sub>/F<sub>2</sub> Mode on Programmer

**RAM All Clear** Clear → Step → 0 → Step → 1K 999 or 2K 1999 → Del

**PROGRAM ENTRY** Clear → Step → A A A → Instr → Command → Dev # → Write → Step +/-

Not Required for Step 0  
LD, LDI, Out, etc.

## PROGRAM READ & MODIFICATION

Specify Step:

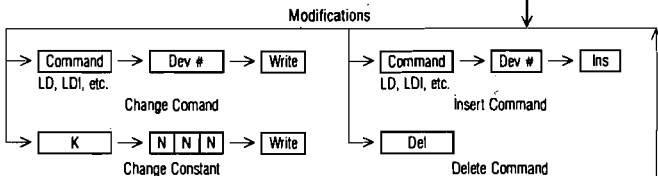
Clear → Step → A A A → Instr → Step +/-

Not Required for Step 0

Specify Command:

Clear → Command → Dev # → Instr → Step +/-

LD, LDI etc.



## CHECK PROGRAM

Clear → Step → 1 → Write → Error Code → Instr

2 → Write → Check Format of Instruction

3 → Write → Checksum Error 3.1

4 → Write → Duplicate Coil # Displayed

## EEPROM

Write Clear → Step → 8 0 9 → Write → Write RAM → EEPROM

Read Clear → Step → 9 0 8 → Write → Write EEPROM → RAM

Verify Clear → Step → 8 1 9 → Write → Write EEPROM ↔ RAM

## Monitor Mode PC (Run or Stop) Select Monitor Mode on Programmer

### FORCE ON/OFF

Clear → Dev # → Monitor → S On

Step +/- → R Off

### CHANGE CONSTANT

Clear → Dev # → Search → Monitor → Step +/- → N N N → Write

Changes Value In Out T, C, F Instruction

### CHANGE DATA

Clear → Dev # → End → Monitor → N N N → Write → Step +/-

### STEP LADDER MONITOR

Clear → X Y Z → End → Monitor → Step +/-

X = 6, 8, 9  
Y = 0 - 7 (For X = 6, Y = 0 - 4)  
Z = 0 - 7