operation manual

ZNC 68

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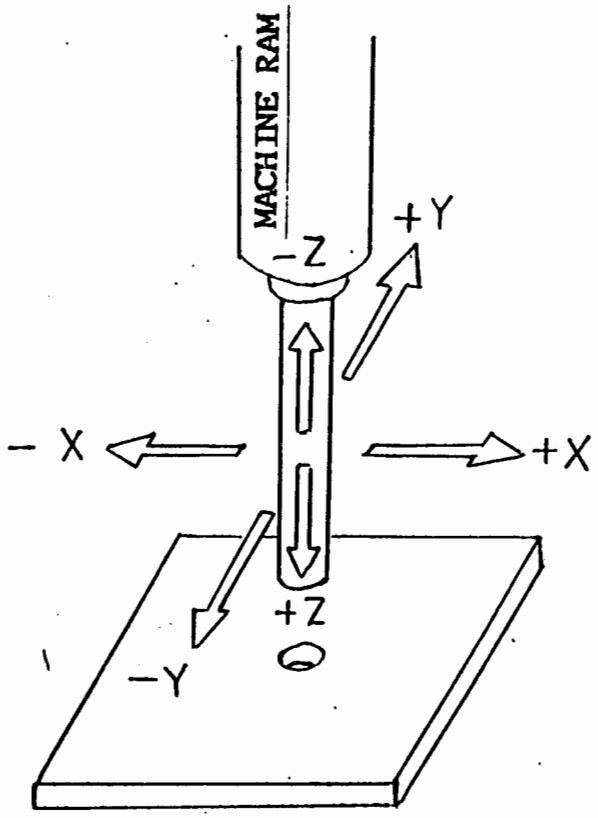
VERY IMPORTANT

EXPLANATION OF 3 AXES' COORDINATES DIRECTION.



IN THIS MACHINE, THE 3 AXES' MOVING DIRECTION WERE DESIGNED THAT THE MACHINE SPINDLE (THE RAM, OR SHALL WE SAY THE ELECTRODE) AS THE MOVING OBJECT.

ABOVE SKETCH SHOWS THAT:

PLEASE NOTE FOLLOWING MOVING DIRECTION OF EACH AXIS AND REFER TO ABOVE SKETCH:

* Z AIXS, ELECTRODE MOVING UPWARD IS THE DIRECTION OF " Z —".
  ELECTRODE MOVING DOWNWARD IS THE DIRECTION OF " Z +".
  (SO, WHEN YOU EDITING A PROGRAM TO SPARK DOWNWARD INTO WORKPIECE, YOU HAVE TO GIVE Z AXIS A POSITIVE FIGURE, I.E. Z= +10mm MEANING SPARK 10mm DEPTH DOWNWARD)
* X AXIS, ELECTRODE MOVING TO THE RIGHT-HAND SIDE IS THE DIRECTION OF " X +".
  ELECTRODE MOVING TO THE LEFT-HAND SIDE IS THE DIRECTION OF " X —".
* Y AXIS, ELECTRODE MOVING INWARD(TO MACHINE COLUMN) IS THE DIRECTION OF " Y +".
  ELECTRODE MOVING OUTWARD(FROM MACHINE COLUMN) IS THE DIRECTION OF " Y —".

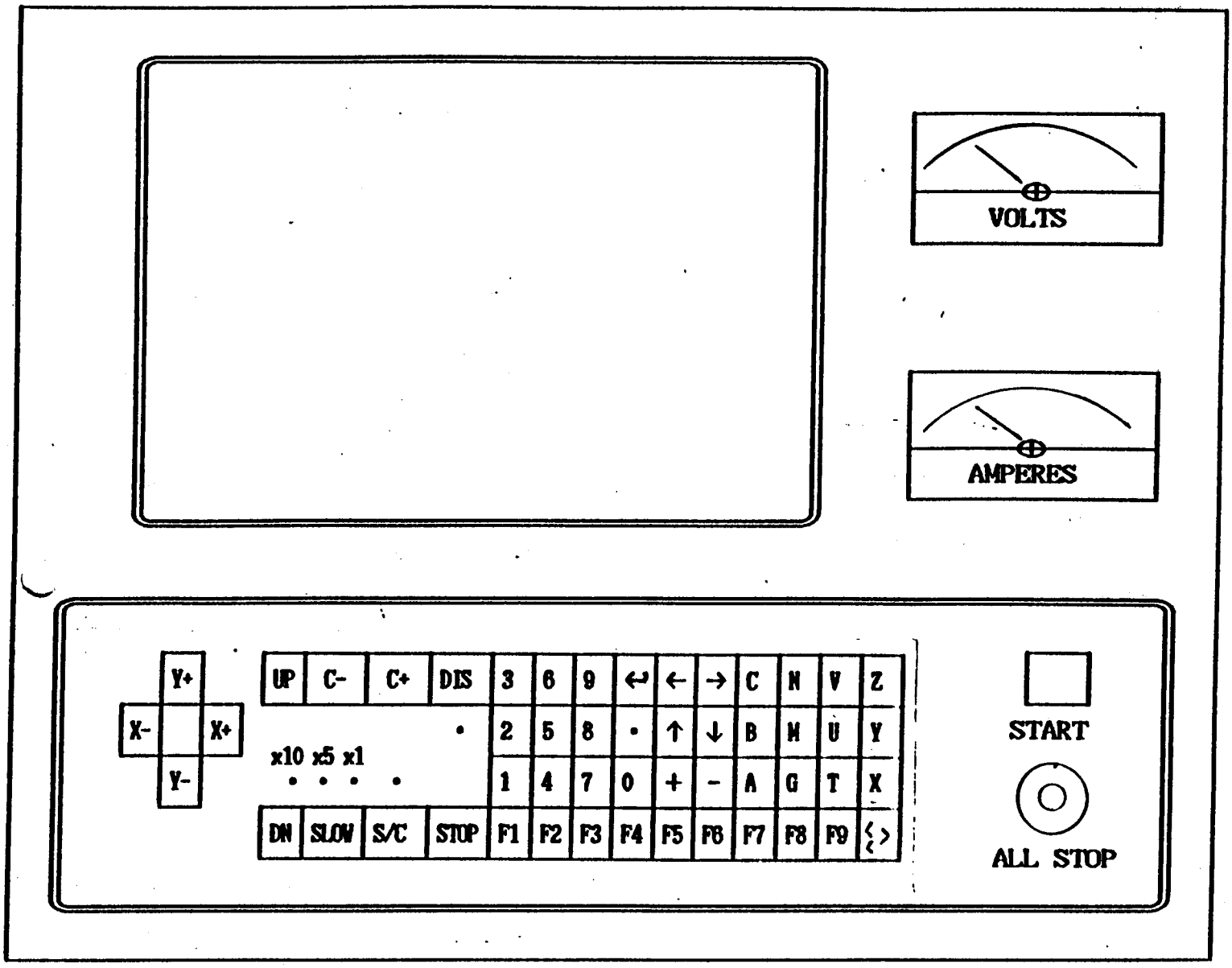


FIG.1 MAIN PANEL

DESCRIPTION OF KEYBOARD

1. FUNCTION KEYS : F1 TO F9 ARE DESIGNATED WITH RESPECTIVE FUNCTION TO EACH PAGE FOR OPERATION AND EDITING PROGRAMS.

2. NUMERAL KEYS : FOR DATA EDIT & INPUT.

3. DECIMAL POINTS : FOR DECIMAL FIGURES INPUT.

4. SIGN KEYS : + — REPRESENT THE POSITIVE AND NEGATIVE OF A FIGURE.

5. DIRECTION KEYS : ↑ ↓ ← → MOVE CURSOR AND INCREASE/ DECREASE THE NUMBER.

6. ENTER KEY [←] : CONFIRM THE DATA AND STORE IT INTO THE MEMORY.

7. CONTROL KEYS : THERE ARE 8 DIFFERENT CONTROL KEYS. THOSE KEYS CAN BE SET ON RESPECTIVELY, FACTORY PRESET 4 CONTROL KEYS AT "ON" POSITION (HIGH LIGHTED), THERE ARE A:FAST JMP M:EQU B:BUZZER N:SYNC FLUSH. IF OTHER RESPECTIVE KEY IS PRESSED (HIGH LIGHTED), THE RESPECTIVE CONTROL IS THEN TURNED ON. PRESS THE KEY AGAIN TO SWITCH OFF THE FUNCTION.

A:FAST JMP	*	Z AXIS APPOACHING & RETRACT AT FASTER SPEED.
B:BUZZER	*	TURN ON/OFF THE ALARM FOR ERROR ENCOUNTERING.
C:SLEEP	*	IF THIS FUNCTION IS ON, THE CONTROL SYSTEM WILL SWITCH OFF MACHINE POWER WHEN A JOB (A PROGRAM) IS COMPLETED.
G:OIL LEVEL	*	SYSTEM WILL STOP SPARKING WHEN DETECTING DIELECTRIC LEVEL IS LOWER THAN THE PRESET LEVEL IF THIS CONTROL IS ENABLED. ALSO, WHEN THIS FUNCTION IS "ON", AND DIELECTRIC FLUID DOES NOT REACH PRESET LEVEL, DISCHARGE FUNCTION CAN NOT BE ACTIVATED.
M:EQU.	*	EQUAL ENERGY DISCHARGING, TO STABILIED POWER OUTPUT.
N:SYNC FLUSH	*	WHEN THIS KEY IS "ON", DIELECTRIC PUMP MOTOR WILL START TO SUPPLY DIELECTRIC FLUID ONLY AFTER PUSH "ON" DISCHARGING KEY. IF OPERATOR TURN OFF THIS KEY, DIELECTRIC PUMP MOTOR WILL "ON" AND SUPPLY FLUID AS SOON AS THE MACHINE POWER IS "ON".
T:PUL FLUSH	*	DURING SPARKING CYCLE, ONE FLUSHING TUBE WILL ACTIVATED ONLY WHEN ELECTRODE LIFT UP FROM WORKPIECE.
U:ARC ADJ	*	TO ACTIVATE ARC DETECTING & PROTECTING CIRCUIT.

8. QUIT [< >] : TO JUMP TO PREVIOUS OR NEXT PAGE OF SCREEN DISPLAY. ALSO IN SAME PAGE OF DISPLAY, USE THIS KEY TO MOVE CURSOR FROM UPPER COLUMN DOWN TO LOWER COLUMN.

9. SCREEN SHUTOFF : FOR THE PURPOSE OF EXTENDING THE LIFE OF MONITOR. THE SYSTEM WILL TRUN OFF THE SCREEN DISPLAY DURING SPARKING, APPROXIMATELY 5 MINUTES AFTER YOUR LAST USING KEYBOARD. TO RESUME SCREEN DISPLAY, JUST PUSH "Z" KEY.

10. "START" : THIS PUSH BUTTON IS TO TURN ON MACHINE POWER.

11. "ALL STOP" : THIS IS THE EMERGENCY STOP PUSH BUTTON.

12. X+,X—,Y+,Y— :X & Y AXES AUTO MOVEMENT DIRECTIONAL KEYS, FUNCTION NOT AVAILABLE ON ZNC MODEL BECAUSE X& Y MOVED MANUALLY.

13. UP & DN : Z AXIS RAPID TRAVEL PUSH KEY. UP=UPWARD (Z— DIRECTION) DN=DOWNWARD (Z+ DIRECTION).

14. SLOW x10 x5 x1 : THIS IS Z AXIS SLOW MOVEMENT PUSH KEY. SLOW x1=PER PUSH OF UP (OR DN) KEY Z AXIS WILL TRAVEL AT ONE UNIT OF DRO RESOLUTIONS'SPEED.
SLOW x5=5 TIMES FASTER THAN SLOW x1.
SLOW x10=10 TIMES FASTER THAN SLOW x1.
NOTE: THIS SPEED ADJUSTABLE FUNCTION IS VERY HELPFUL AND PRACTICAL WHEN DOING EDGE FINDING JOB AS WELL AS SLOW APPROACHING OF ELECTRODE TO WORKPIECE.

15. C— & C+ : C AXIS DIRECTIONAL MOVEMENT KEY. THIS FUNCTION NOT AVAILABLE ON ZNC OR NC MODEL WITHOUT OPTIONAL C AXIS.

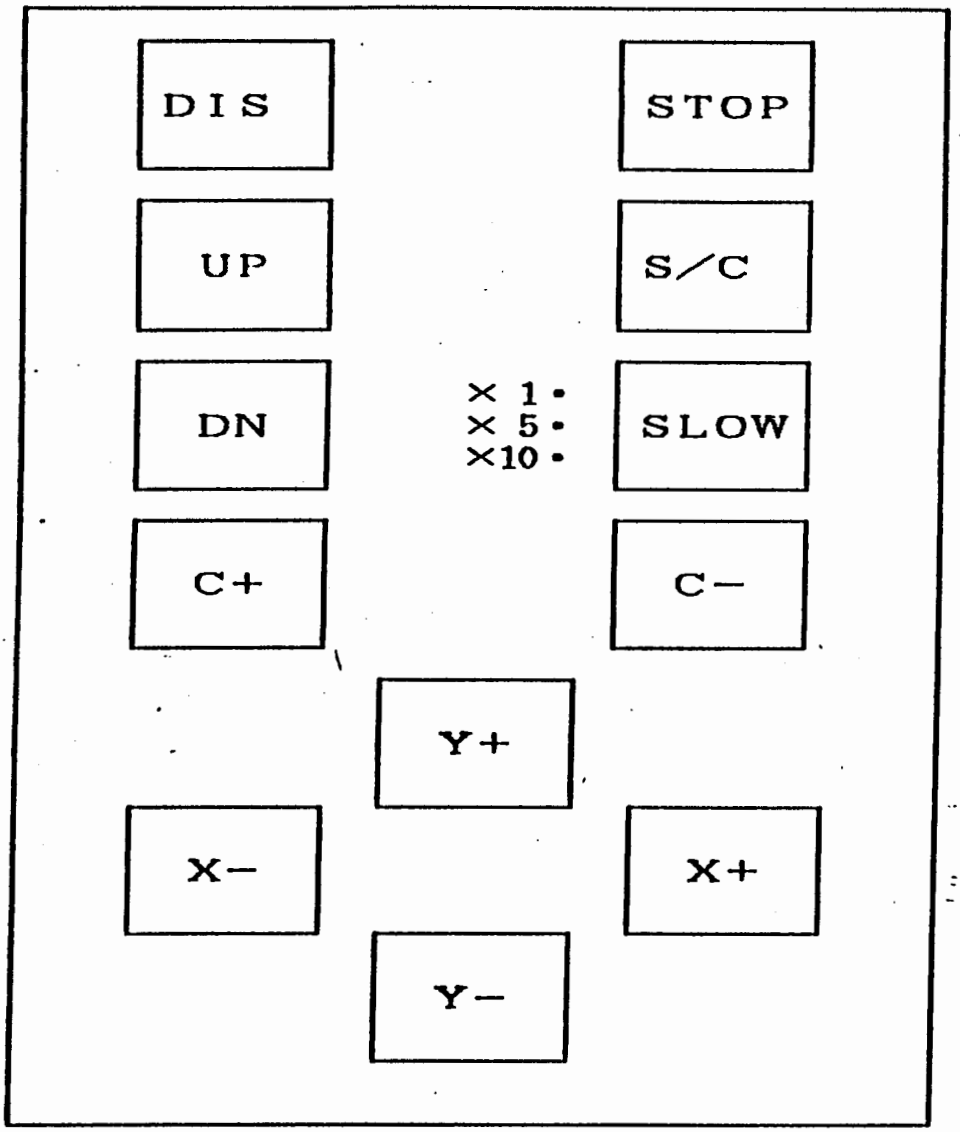
16. DIS : DISCHARGING KEY.

17. STOP : TO STOP DISCHARGING.

18. S/C : SHORT CIRCUIT PROTECTION KEY. "VERY IMPORTANT".
IF THIS PRESSED, MEANING ELECTRODE CAN TRAVEL FREELY, EVEN WHEN IT TOUCHED WORKPIECE, THE ELECTRODE WILL NOT STOP BECAUSE SHORT CIRCUIT PROTECTION BETWEEN ELECTRODE AND WORKPIECE TURNED OFF BY PRESSING THIS S/C KEY. SO PLEASE USE THIS KEY/FUNCTION WITH MOST CARE.

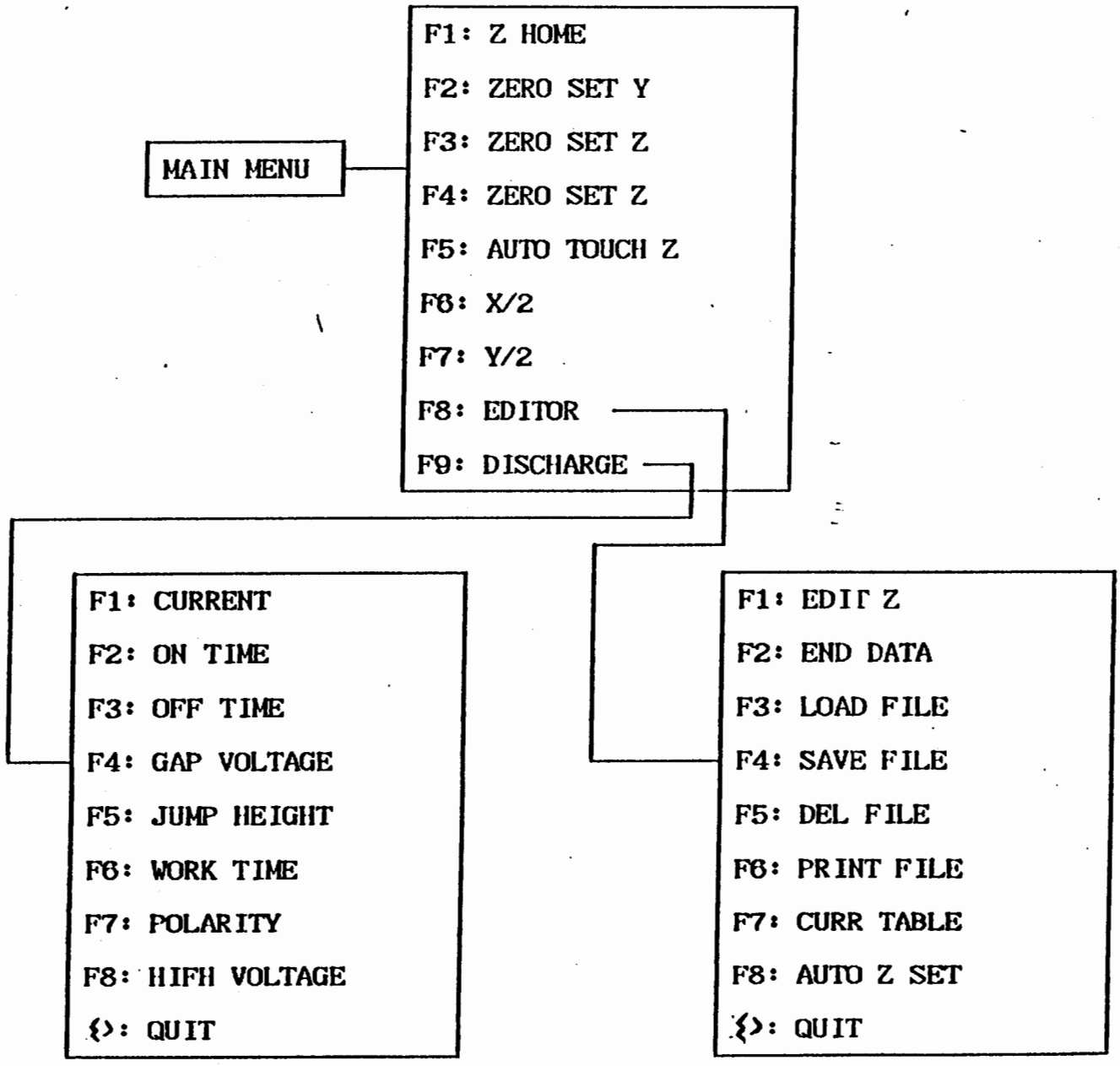
WHENEVER, THE SCREEN DISPLAY SHOWS " Z AXIS SHORT CIRCUIT", YOU HAVE TO PUSH THIS S/C KEY FIRST (TO TURN OFF SHORT CIRCUIT PROTECTION) THEN PUSH "UP" KEY TO BRING UP THE ELECTRODE FROM WORKPIECE.

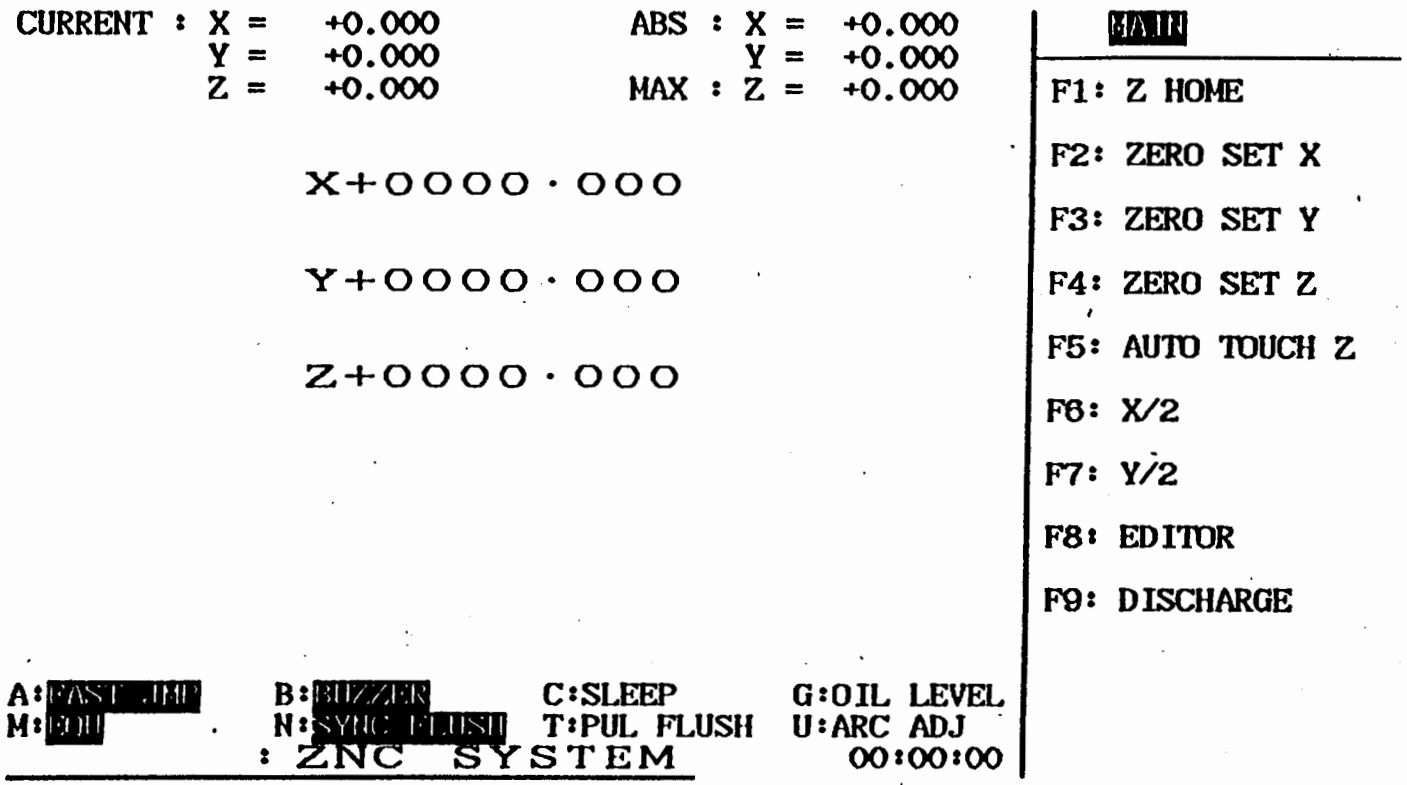
REMOTE CONTROLLER



DIS KEY : TO START SPARKING.
STOP KEY : TO STOP SPARKING.
UP KEY : Z AXIS RAPID TRAVEL AT UPWARD (Z−DIRECTION).
DN KEY : Z AXIS RAPID TRAVEL AT DOWNWARD (Z+DIRECTION).
S/C KEY : SHORT CIRCUIT PORTECTION KEY. VERY IMPORTANT.
PUSH ON THIS KEY MEANING Z AXIS CAN TRAVEL FREELY AND ELECTRODE WILL NOT STOP WHEN TOUCHING WORKPIECE. SO BE VERY CAREFUL WHEN USING THIS KEY.
WHENEVER MONITOR DISPALY SHOWS "Z AXIS SHORT CIRCUIT",PUSH THIS KEY TOGETHER WITH UP KEY TO BRING UP ELECTRODE FROM WORKPIECE.
SLOW KEY : Z AXIS SLOW MOVEMENT PUSH KEY.
x 1=SLOWEST SPEED.
x 5=5 TIMES FASTER THAN x1 SPEED.
x10=10 TIMES FASTER THAN x1 SPEED.
C+,C−,X+ :
X−,Y+,Y− : THOSE KEYS HAVE NO FUNCTION ON ZNC MODEL MACHINE.

MENU CHART


MAIN MENU
F1: Z HOME
F2: ZERO SET Y
F3: ZERO SET Z
F4: ZERO SET Z
F5: AUTO TOUCH Z
F6: X/2
F7: Y/2
F8: EDITOR
F9: DISCHARGE
F1: CURRENT
F2: ON TIME
F3: OFF TIME
F4: GAP VOLTAGE
F5: JUMP HEIGHT
F6: WORK TIME
F7: POLARITY
F8: HIFH VOLTAGE
{>: QUIT
F1: EDIT Z
F2: END DATA
F3: LOAD FILE
F4: SAVE FILE
F5: DEL FILE
F6: PRINT FILE
F7: CURR TABLE
F8: AUTO Z SET
{>: QUIT


CURRENT : X = +0.000
Y = +0.000
Z = +0.000
ABS : X = +0.000
Y = +0.000
MAX : Z = +0.000
X+0000·000
Y+0000·000
Z+0000·000
MAIN
F1: Z HOME
F2: ZERO SET X
F3: ZERO SET Y
F4: ZERO SET Z
F5: AUTO TOUCH Z
F6: X/2
F7: Y/2
F8: EDITOR
F9: DISCHARGE
A:FAST JMP
B:BUZZER
C:SLEEP
G:OIL LEVEL
M:EDIT
N:SYNC FLUSH
T:PUL FLUSH
U:ARC ADJ
: ZNC SYSTEM
00:00:00

MAIN MENU

F1 : Z HOME - YOU HAVE TO PUSH THIS KEY FOR EACH AND EVERY JOB THAT YOU WANT TO, SPARK. THIS FUNCTION IS TO SEND Z AXIS TO ITS MECHANICAL ORIGINS "ZERO".

F2 : ZERO SET X - SET THE CURRENT RELATIVE COORDINATE OF X-AXIS TO ZERO AS REFERENCE POINT.

F3 : ZERO SET Y - SET THE CURRENT RELATIVE COORDINATE OF Y-AXIS TO ZERO AS REFERENCE POINT.

F4 : ZERO SET Z - SET THE CURRENT RELATIVE COORDINATE OF Z-AXIS TO ZERO AS REFERENCE POINT.

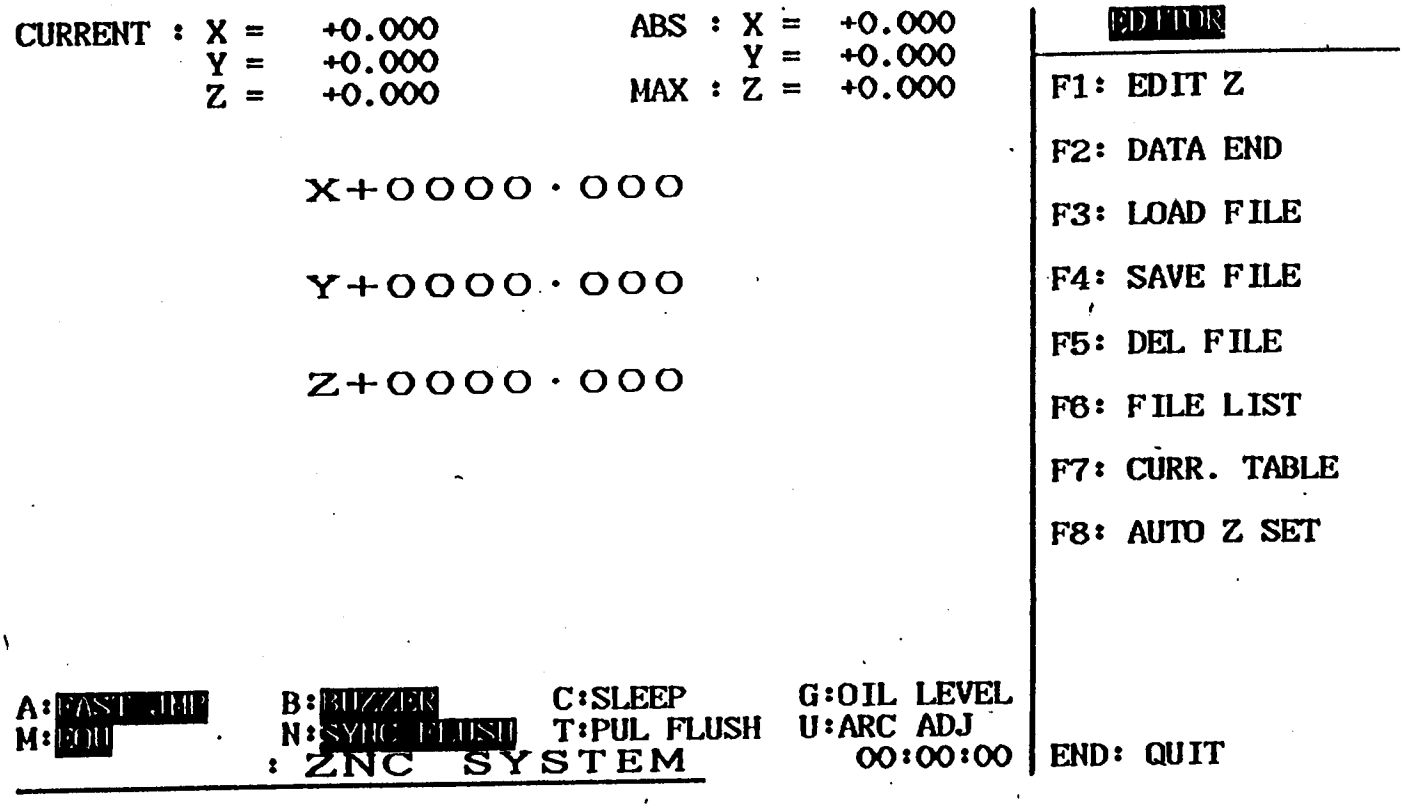
F5 : AUTO TOUCH Z - INVOKE THIS FUNCTION THEN SYSTEM AUTOMATICALLY MOVE THE ELECTRODE DOWN UNTIL THE SURFACE OF WORKPIECE IS TOUCHED.

F6 : X/2 - INVOKE THIS FUNCTION THEN SYSTEM WILL CALCULATE THE CENTER POINT BETWEEN ZERO (SET BY F2) AND CURRENT COORDINATE. THE FIGURES IS SHOWN ON SCREEN.

F7 : Y/2 - SAME AS THE ABOVE BUT FOR Y-AXIS.

F8 : EDITOR - PUSH THIS KEY TO GET INTO "EDIT".

F9 : DISCHARGE - TO START PAGE SPARKING.


CURRENT : X = +0.000
Y = +0.000
Z = +0.000
ABS : X = +0.000
Y = +0.000
MAX : Z = +0.000
X+0000.000
Y+0000.000
Z+0000.000
EDITOR
F1: EDIT Z
F2: DATA END
F3: LOAD FILE
F4: SAVE FILE
F5: DEL FILE
F6: FILE LIST
F7: CURR. TABLE
F8: AUTO Z SET
A: FAST JUMP
B: BUZZER
C: SLEEP
G: OIL LEVEL
M: EDIT
N: SYNC FLUSH
T: PUL FLUSH
U: ARC ADJ
: ZNC SYSTEM
00:00:00
END: QUIT

"EDITOR" PAGE FUNCTION KEY EXPLANATION.

F1 : EDIT Z. - PUSH THIS KEY TO ENTER MANUALLY EDITING SPARKING PARAMETERS VALUE. OPERATOR HAS TO COMPLETE ALL PARAMETERS VALUE ONE BY ONE MANUALL.

F2 : END DATA. - AFTER COMPLETELY EDIT A SPARKING PROGRAM, MOVE THE CURSOR TO THE LAST SPARKING STEP AND PUSH THIS KEY TO COMFIRM (TO COMPUTER) A PROGRAM IS COMPLETED, AND A LETTER "E" WILL SHOWN NEXT TO THE LAST SPARKING STEP (H). MACHINE WILL THEN SPARKING TO THIS LAST STEP AND STOP.

F3 : LOAD FILE. - TO CALL OUT A PREVIOUSLY SAVED FILE (PROGRAM).

F4 : SAVE FILE. - TO MEMORIZED PRESENTLY EDITTED PROGRAM INTO FILE LIST. YOU USE FILE NO. 0 - 999, HOWEVER, THE TOTAL CAPACITY OF MEMORY IS ONLY UP TO 60 FILES.

F5 : DEL FILE. - TO DELETE A PREVIOUSLY SAVED FILE FROM FILE LIST.

( ) : FILE LIST. - PUSH THIS KEY TO SEE ALL PREVIOUSLY SAVED FILES (PROGRAMS). THE TOTAL FILE LIST CAPACITY IS 60 FILES.

F7 : CURR. TABLE. - THE RELATIONSHIP BETWEEN CURRENT OUTPUT VALUE TO ON-TIME VALUE, THIS TABLE WERE PRE-SET BY FACTORY. PLEASE REFER TO "CURRENT TABLE" PAGE FOR EXPLANATION.

F8 : AUTO Z SET. - THIS IS A AUTOMATICAL EDITING PROGRAM FUNCTION. AFTER PUSH THIS KEY, SCREEN WILL DISPLAY "DEPTH:" & "CURRENT:" FOR OPERATOR TO KEY IN TOTAL DEPTH DESIRED TO SPARK AND THE MAXIMUM STARTING SPARKING CURRENT. AND COMPUTER WILL GIVE OPERATOR A FULL PROGRAM AUTOMATICALLY.
IF OPERATOR WISHED TO CHANGE SOME OF PARAMETERS VALUE WHICH GIVEN FROM THIS FUNCTION, THEN OPERATOR CHANGE THEN MANUALLY BEFORE SPARKING OR AFTER SPARKING.

END : QUIT.  - TO JUMP OUT OF THIS EDITOR PAGE, PLEASE PUSH THIS KEY.

CURRENT TABLE

AMP	FREQUENCY									
	0	1	2	3	4	5	6	7	8	9
0	6	25	50	70	90	100	110	120	130	140
1	150	170	190	210	230	250	270	300	330	370
2	400	410	420	430	440	450	460	470	480	490
3	500	510	520	530	540	550	560	570	580	590
4	600	610	620	630	640	650	660	670	680	690
5	700	710	720	730	740	750	760	770	780	790
6	800	810	820	830	840	850	860	870	880	890
7	900	910	920	930	940	950	960	970	980	999

THIS PAGE TO SHOW YOU BUILT-IN CURRENT OUTPUT VALUE IN RELATIONSHIP TO THE "ON-TIME" VALUE.
THE CURRENT UNIT IS IN "AMP".
THE ON-TIME UNIT IS IN "MICRO-SECOND"(us).
FOR EXAMPLE:
- AT 0 AMP, THE ON-TIME VALUE IS 6 us.
- AT 6 AMP, THE ON-TIME VALUE IS 110 us.
- AT 10 AMP, THE ON-TIME VALUE IS 150 us.
- AT 23 AMP, THE ON-TIME VALUE IS 130 us.
- AT 50 AMP, THE ON-TIME VALUE IS 700 us.
- AT 55 AMP, THE ON-TIME VALUE IS 750 us.

CURRENT : X = +00000.000 ABS : X = +00000.000
Y = +00000.000 Y = +00000.000
Z = +00000.000 Z = +00000.000

EDITOR

F1: EDIT Z
F2: DATA END
F3: LOAD FILE
F4: SAVE FILE
F5: DEL FILE
F6: FILE LIST
F7: CURR. TABLE
F8: AUTO Z SET

CH	DEPTH	I	Ton	Tof	Gap	Jmp	W-T	Pol	H-V
0	+9.000	15	300	7	50	5	10	0	2
E1	+10.000	10	220	7	50	5	10	0	2
2									
3									
4									
5									
6									
7									
8									
9									

HOME	DWELL
-1.000	5

A: FAST JOG B: BUZZER C: SLEEP G: OIL LEVEL
M: FOU N: SYNC FLUSH T: PUL FLUSH U: ARC ADJ
: ZNC SYSTEM 00:00:00

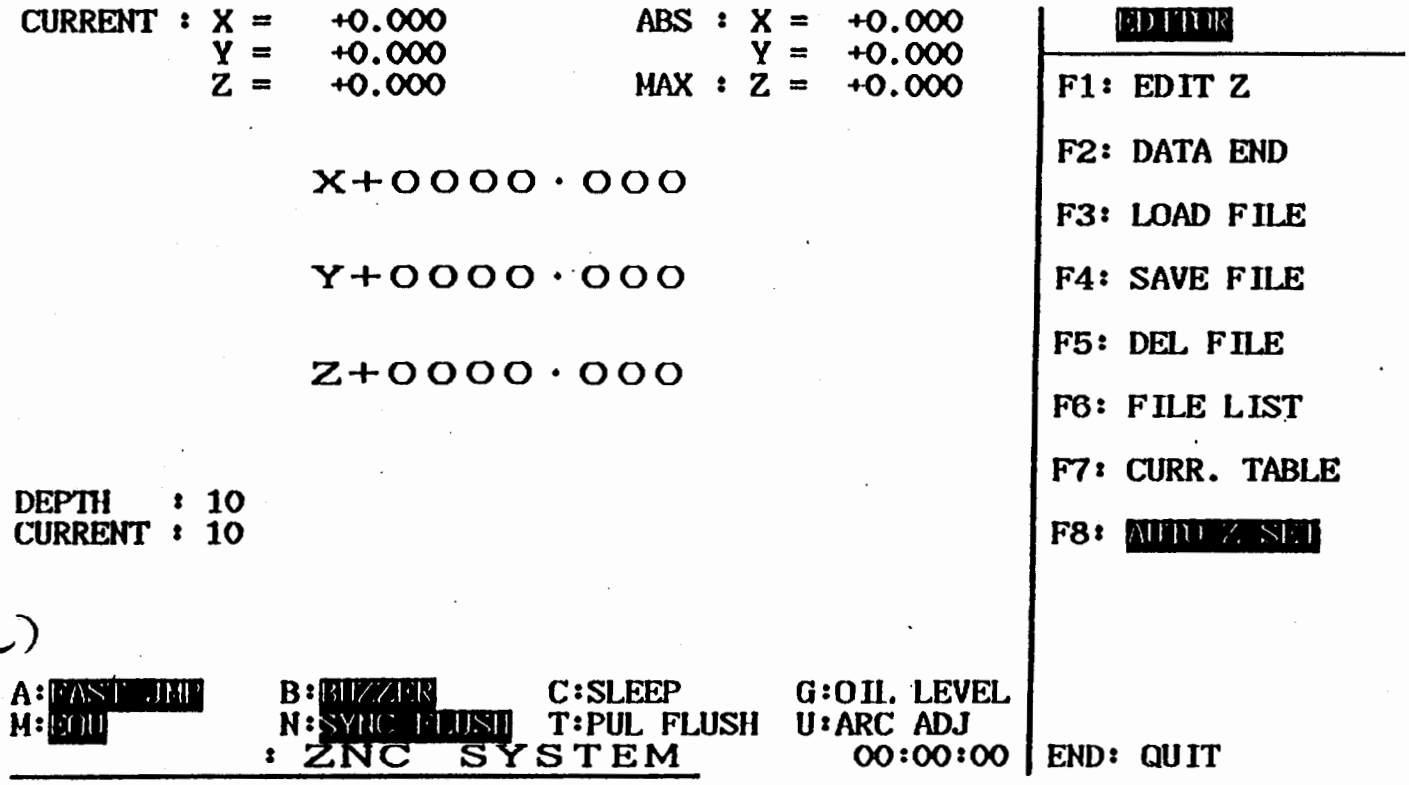
END: QUIT

THIS PAGE TO SHOW YOU F1 FUNCTION, MANUAL EDITING PARAMETERS VALUE BY OPERATOR. YOU HAVE TO FILL IN PARAMETER VALUE ONE BY ONE MANUALLY. ABOVE EXAMPLE MEANING:
OPERATOR WANTS TO SPARK TOTAL DEPTH 10mm WHICH HE USE 2 STEPS (CH)
FIRST STEP (CH) 0, TO SPARK 9.00mm DEPTH WITH ROUGHING PARAMETERS VALUE
SECOND STEP (CH) 1, TO SPARK TO 10mm DEPTH WITH MID-ROUGHING SETTINGS.
BASICALLY TO SAY, THIS IS A STANDARD ROUGHING PROGRAM.

NOTE: THE F2 "DATA END" KEY MUST BE PUSHED WHEN YOU COMPLETE YOUR PROGRAM.
IN THIS CASE THE "E" WERE SHOWN NEXT TO STEP (CH) 1.

** DWELL=5. SPARK OUT FUNCTION. IN THIS CASE, WHEN SPARKING TO THE PRE-SET DEPTH 10mm, THE MACHINE WILL NOT STOP SPARKING, INSTEAD, IT WILL LOCK UP THE Z AXIS AND CONTINUE TO SPARK (SPARK OUT FUNCTION) FOR 5 MINUTES AND THEN STOP AUTOMATICALLY.
DWELL, SPARKING OUT FUNCTION, IS COUNTING IN MINUTE, I.E. 1=1 MINUTE 10=10 MINUTES.

** HOME = -1.000. THIS MEANS THAT ELECTRODE WILL LIFT UP AUTOMATICALLY 1mm HIGHER THAN WORKPIECE SURFACE AS SOON AS PRE-SET DEPTH & SPARK OUT TIME (IF DWELL FUNCTION WERE PRE-SET) IS REACHED.
NOTE, THE FIGURE MUST BE A (-) NEGATIVE NUMBER.



*TO SHOW F8 KEY AUTO Z SET FUNCTION.
EXAMPLE HERE, DEPTH KEY IN 10 MEANING TOTAL SPARKING DEPTH IS 10mm.
CURRENT KEY IN 10 MEANING THE MAXIMUM STARTING SPARKING CURRENT IS 10A.
THE COMPUTER WILL THEN GIVE YOU A FULL SPARKING SETPS & PARAMETERS VALUE FROM ROUGHING TO FINE FINISHING. PLEASE REFER TO NEXT PAGE FOR DETAILS.

CURRENT : X = +0.000 ABS : X = +0.000
Y = +0.000 Y = +0.000
Z = +0.000 Z = +0.000

EDITOR

F1: EDIT Z

F2: DATA END

F3: LOAD FILE

F4: SAVE FILE

F5: DEL FILE

F6: FILE LIST

F7: CURR. TABLE

F8: AUTO Z SET

CH	DEPTH	I	Ton	Tof	Gap	Jmp	W-T	Pol	H-V
0	+9.750	10	300	7	40	5	10	0	2
1	+9.820	10	220	7	40	5	10	0	2
2	+9.900	7	100	6	40	5	10	0	2
3	+9.950	5	50	5	40	5	10	0	2
4	+9.970	3	25	4	40	5	5	0	2
5	+9.980	2	12	4	50	5	5	0	1
6	+10.000	1	6	4	50	5	5	0	1
7	+0.000	0	100	7	50	5	10	0	2
8	+0.000	0	100	7	50	5	10	0	2
9	+0.000	0	100	7	50	5	10	0	2

HOME	DWELL
-1.000	5

A:FAST JUMP B:BUZZER C:SLEEP G:OIL LEVEL
M:EQU N:SYNC FLUSH T:PUL FLUSH U:ARC ADJ
: ZNC SYSTEM 00:00:00

END: QUIT

* TO SHOW F8 KEY AUTO Z SET FUNCTION WITH DEPTH=10 & CURRENT=10 NOTE THE CURSOR AT LAST STEP (CH6) AND THE DATA END MARK "E" ALSO STAY AT CH6 WHICH MEANS THIS PROGRAM WILL END HERE. IF YOU ONLY WANT TO SPARK TO THE DEPTH OF 9.950mm FOR THIS PROGRAM, THEN MOVE THE CURSOR UP TO CH3 (THE 4th STEP) AND THEN PUSH F2 KEY (DATA END) AND THE "E" MARK WILL MOVE TO CH3 TOO, WHICH MEANS THIS PROGRAM WILL END AT CH3 AND MACHINE WILL NOT FURTHER SPARK DOWN DEEPER THAN 9.950mm.

* HOW TO MOVE CURSOR FROM PARAMETERS COLUMN DOWN TO "HOME & DWELL" COLUMN:

PLEASE PUSH  QUIT KEY.

* HOME = -1.000. THIS MEANS THAT ELECTRODE WILL LIFT UP AUTOMATICALLY 1mm HIGHER THAN WORKPIECE SURFACE AS SOON AS PRE-SET DEPTH & SPARK OUT TIME (IF DWELL FUNCTION WERE PRE-SET) IS REACHED.
NOTE, THE FIGURE MUST BE A (-) NEGATIVE NUMBER.

* DWELL= 5. THIS IS "SPARK OUT" FUNCTION KEY. IN THIS CASE DWELL=5 MEANING WHEN SPARKING TO THE PRE-SET DEPTH 10mm, MACHINE WILL NOT STOP SPARKING, INSTEAD, IT WILL LOCK UP Z AXIS AND CONTINUE TO SPARK (NO FURTHER DEEPER) FOR 5 MINUTES AND THEN STOP AUTOMATICALLY. "DWELL" SPARK OUT FUNCTION IS COUNTING IN MINUTE, I.E. 1=1 MINUTE & 10=10 MINUTES.

```
CURRENT : X =   +0.000          ABS : X =   +0.000
          Y =   +0.000                Y =   +0.000
          Z =   +0.000          MAX : Z =   +0.000

X+OOOO·OOO      CURRENT    : 10(A)
                ON TIME    :300(uS)
                OFF TIME   :  7(70%)
Y+OOOO·OOO      GAP VOLT   : 40(V)
                JMP LENG   :  5(0.5m)
                WORK TIME  : 10(1.0S)
Z+OOOO·OOO      POLARITY   :  0(+/-)
                HIGH VOLT  :  2(200V)

                                        START Z : 0
                                        STOP  Z : 6
                                        WORK  Z : 0
DEPTH          :   10.000 m/m           WORK DEP: 9.750 m/m

A:[FAST JUMP]   B:[BUZZER]      C:SLEEP      G:OIL LEVEL
M:[EDIT]        N:[SYNC FLUSH]  T:PUL FLUSH  U:ARC ADJ
                : ZNC SYSTEM                 00:00:00
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[CONDITION]
F1: CURRENT
F2: ON TIME
F3: OFF TIME
F4: GAP VOLT
F5: JUMP LENGTH
F6: WORKING TIME
F7: POLARITY
F8: HIGH VOLT
F9: TIME ZERO
[↑]:INC [↓]:DEC

END: QUIT
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EXPLANATION:

* DEPTH : 10.000m/m. MEANING TOTAL SPARKING DEPTH OF THIS PROGRAM IS 10mm.
* START Z : 0. MEANING THIS PROGRAM STARTING FROM CH 0 WHICH IS THE FIRST STEP.
* STOP Z : 6. MEANING THIS PROGRAM IS ENDED AT CH 6 WHICH IS THE 7th (LAST) STEP.
* WORK Z : 0. MEANING NOW IS SPARKING CH 0 (FIRST STEP).
* WORK DEP: 9.750m/m. MEANING THE PRESENT WORKING STEP (CH 0) IS TO SPARK DOWN 9.750mm IN DEPTH.
* 00:00:00: MEANING TOTAL SPARKING TIME. ONCE PUSH ON DIS. THE SPARKING TIME STARTING TO ACCUMULATING TOTAL SPARKING TIME.
  YOU CAN "ZERO" IT BY PUSHING F9 KEY (TIME ZERO).

*, [↑]:INC [↓]:DEC: DURING SPARKING, YOU CAN CHANGE PRESENT SPARKING STEP'S PARAMENTERS VALUE. I.E. YOU WANT TO CHANGE CURRENT VALUE FROM 10A TO 8A.
-PUSH F1 KEY AND THE LETTER WILL BE HIGHLIGHTED.
-THEN PUSH [↓] KEY TWICE, THE CURRENT VALUE WILL CHANGE TO 8A.
-PUSH F1 KEY ONE MORE TIME AND THE HIGHLIGHT WILL GO OFF, MEANING NOW WORKING AT 8A CURRENT. THE COMPUTER WILL ACCEPT THE NEWLY CHANGED PARAMETER VALUE ONLY AFTER "HIGHLIGHT" BE TAKEN OFF.
[↑]:INC:MEANING TO INCREASE PARAMETER VALUE.
[↓]:DEC:MEANING TO DECREASE PARAMETER VALUE.

EXPLANATION OF PARAMETERS VALUE:

F1 : CURRENT. - THE MAIN CURRENT (LOW VOLTAGE CURRENT) PEAK VAULE OUTPUT IN PUT VALUE FROM 0A UP TO YOUR GENERATOR CAPACITY (I.E. IF YOUR GENERATOR IS 75A SO MAXIMUM KEY IN VALUE IS 75).

F2 : ON TIME. - REPRESENTS THE PULSE ON TIME. IN PUT VALUE FROM 2 TO 999us, UNIT IN MICRO-SECOND.

F3 : OFF TIME. - NUMBERS SHOW HERE IS REPRESENTS "THE PERCENTAGE OF WORKING EFFICIENCY", I.E 7 = 70% OF WORKING EFFICIENCY. IN PUT VALUE FROM 1 TO 9.
NOTE, FOR COPPER ELECTRODE WE RECOMMAND USE 7 (70%) OR 8 (80%) FOR GRAPHITE ELECTRODE WE RECOMMAND USE 6 (60%) OR 7 (70%).

F4 : GAP VOLT. - REPRESENTS THE GAP VOLTAGE BETWEEN ELECTRODE AND WORKPIECE. IN PUT VALUE FROM 25 TO 99(V).

F5 : JUMP LENGTH. - THIS IS THE TIMER WHICH IS THE ELECTRODE LIFT UP DISTANCE DURING A SPARKING CYCLE. PER UNIT = 0.1mm. IN PUT VALUE FROM 0 TO 99. I.E. 5 = 0.5mm, WHILE 0 MEANS NO TIMER.

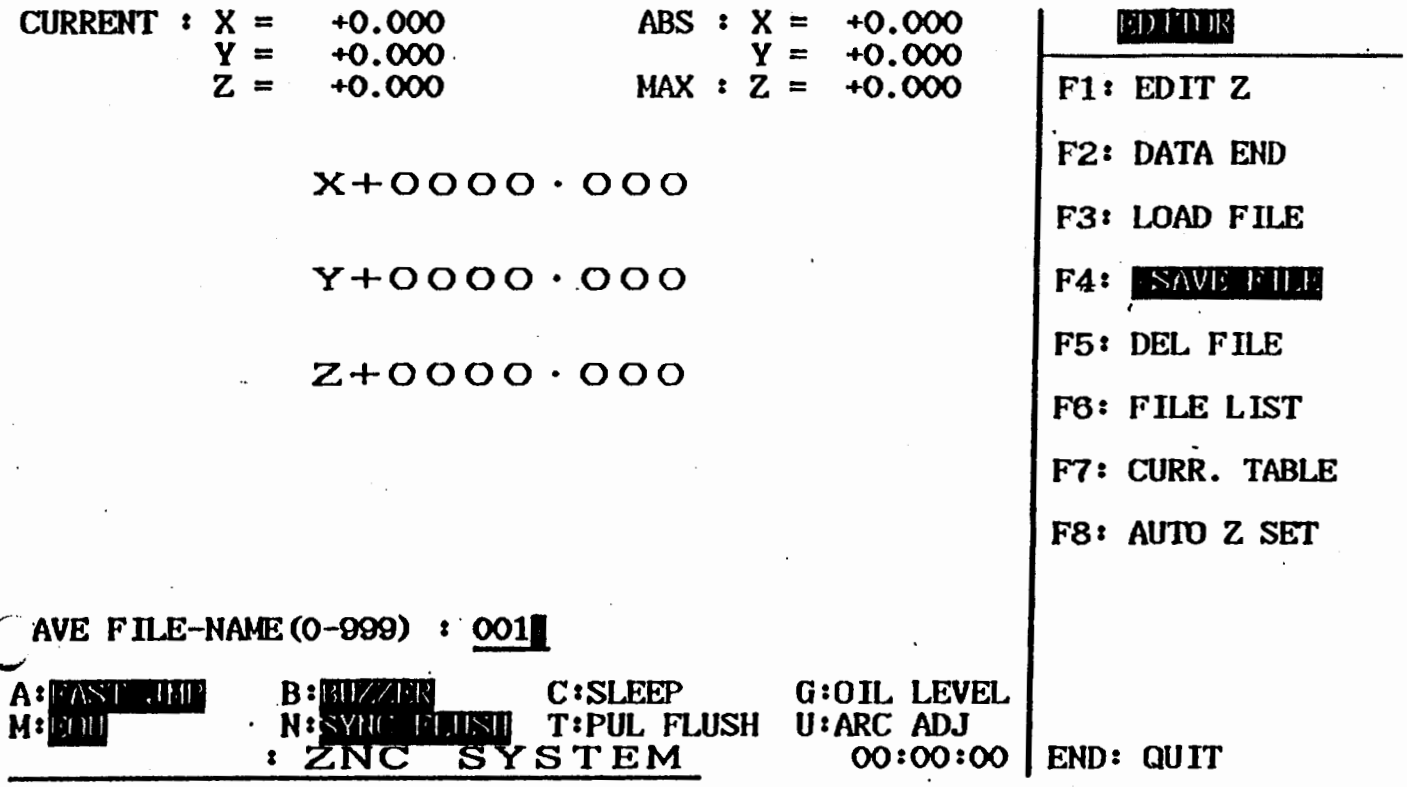
F6 : WORKING TIME. - REPRESENTS THE MACHINING TIME OF A SPARKING CYCLE. PER UNIT = 0.1 SECOND. IN PUT VALUE FROM 0 TO 99. I.E. 10 = 1 SECONDS.

F7 : POLARITY. - ONLY HAS 0 & 1 FIGURE.
0 = ELECTRODE POSITIVE AND WORKPIECE NEGATIVE. (POSITIVE SPARKING).
1 = ELECTRODE NEGATIVE AND WORKPIECE POSITIVE. (NEGATIVE SPARKING).

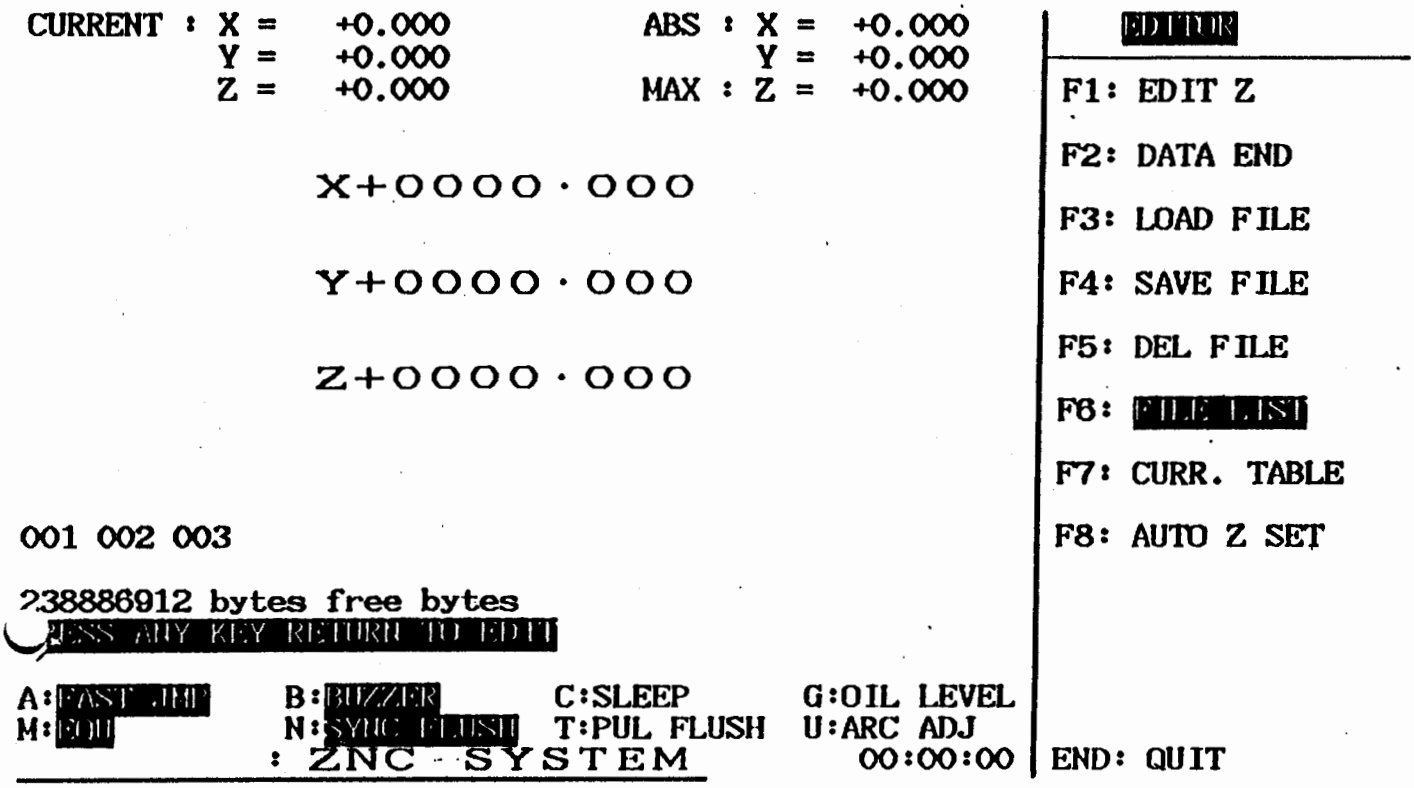
F8 : HIGH VOLT. - THIS IS MICRO FINE CURRENT OUTPUT (HIGH VOLTAGE CURRENT) IN PUT VALUE 0 = 100V, NO HIGH VOLTAGE CURRENT OUTPUT.
1 = 150V WHICH ABOUT 1 AMP OUTPUT.
2 = 200V WHICH ABOUT 1.5 AMP OUTPUT.
3 = 250V WHICH ABOUT 2.5 AMP OUTPUT.

9 : TIME ZERO. - PUSH THIS KEY, THE TOTAL ACCUMULATED SPARKING WILL COME TO ZERO (0) AND RE-START ACUUMULATING SPARKING TIME IF MACHINE IN SPARKING MODE.

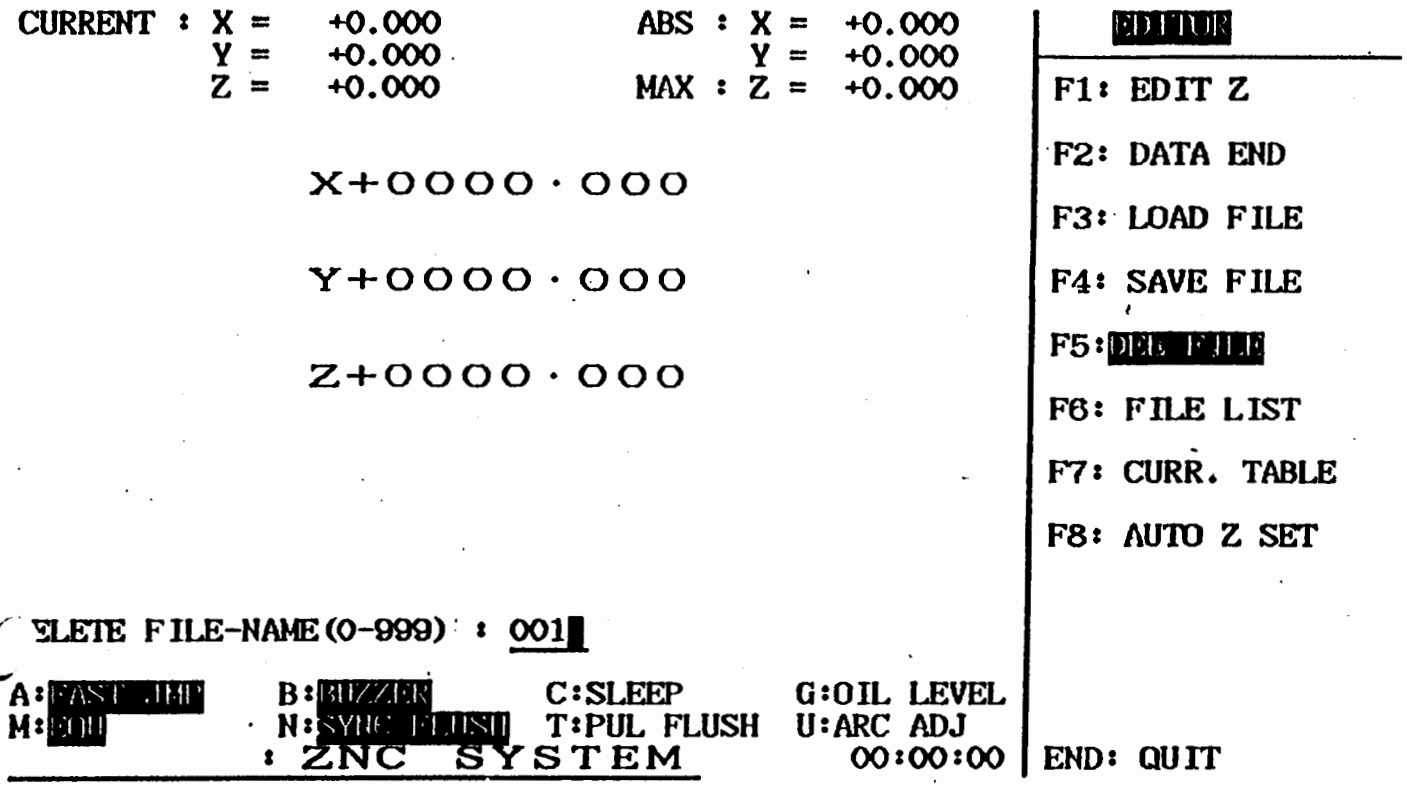
[redacted] INC [redacted] DEC. - FOR ABOVE F1 TO F8 KEYS, IF YOU WANT TO CHANGE PARAMETERS VALUE. PLEASE USE THESE TWO KEYS.
[redacted] INC = INCREASE THE NUMBERS.
[redacted] DEC = DECREASE THE NUMBERS.
NOTE, IF OPERATOR WANT TO CHANGE F1 TO F8 PARAMETERS VALUE, PUSH RESPECTIVE "F" KEY FIRST AND "F" KEY WILL BE HIGH LIGHTED THEN PUSH [redacted] INC OR [redacted] DEC KEY TO CHANGE THE NUMBER (S), FINALLY OPERATOR HAS TO PUSH ONE MORE TIME THE RESPECTIVE "F" KEY SO THAT THE CHANGED NUMBER (S) CAN TRANSMIT INTO COMPUTER AND THE HIGHLIGHT WILL GO OFF.



* TO SHOW F4 KEY "SAVE FILE" DISPLAY.
EXAMPLE HERE, IS TO SAVE (MEMORIED) PROGRAM NO. 0001 INTO FILE LIST.

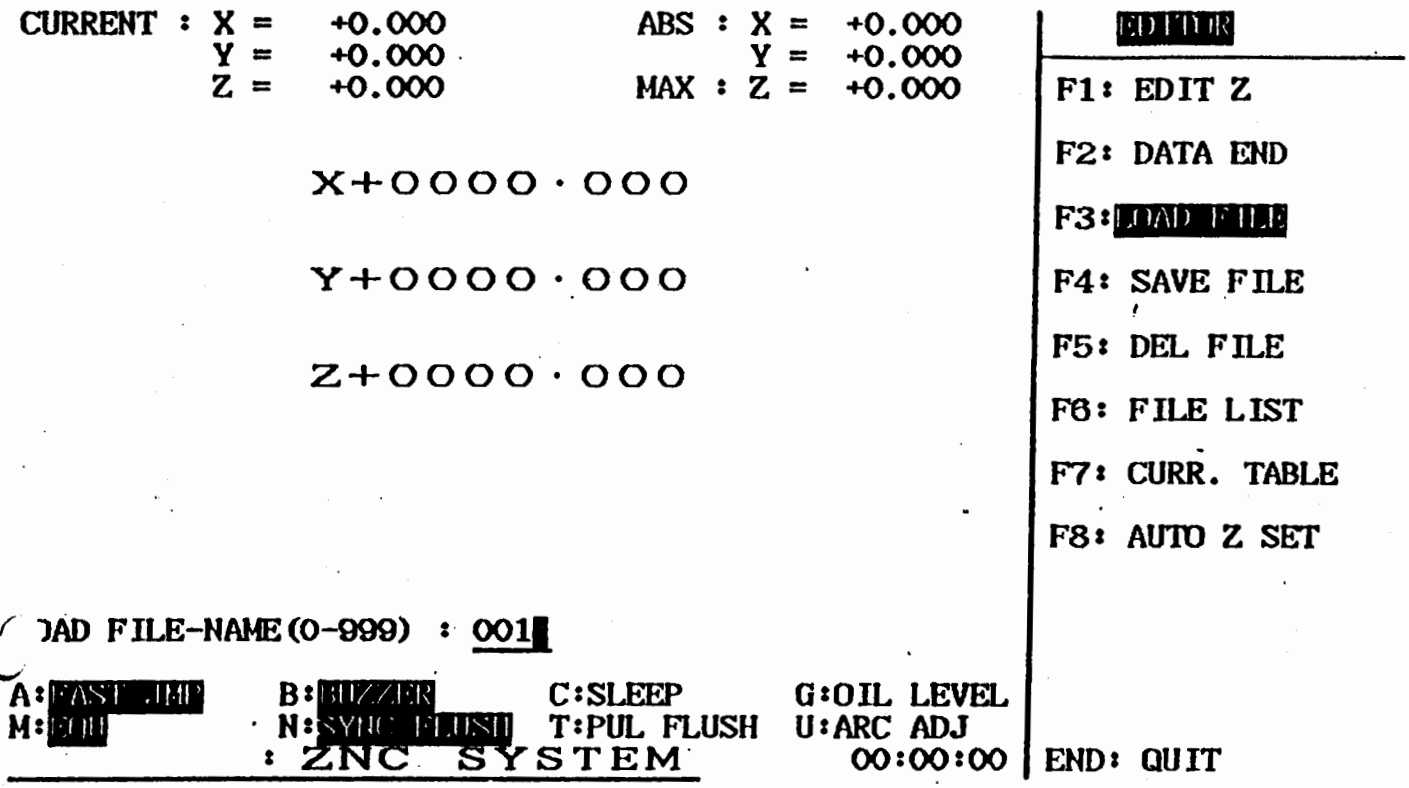


* TO SHOW F6 KEY FILE LIST DISPLAY.
SHOW ABOVE, THERE ARE TOTAL 3 FILES (PROGRAMS) IN THE FILE LIST
AND THERE ARE 001, 002 AND 003.



* TO SHOW F5 KEY DEL FILE DISPLAY
EXAMPLE HERE, IS TO DELETE FILE (PROGRAM) NO.001 FROM FILE LIST.

KEY IN FILE NUMBER WHICH YOU WANT TO DELETE AND THEN PUSH ↵ KEY, AND THE FILE WILL BE DELETED FROM FILE LIST.



* TO SHOW F3 KEY "LOAD FILE" DISPLAY.
EXAMPLE HERE, IS TO LOADING (CALL OUT) PREVIOUS PROGRAM NO. 001 FROM FILE LIST FOR FURTHER USE.

OPERATION PROCEDURE:

1. RELEASE THE EMERGENCY STOP(ALL STOP) SWITCH, TURN "ON" MACHINE POWER. WAIT FOR SCREEN TO SHOW FIRST PAGE DISPLAY AND PUSH ANY TO CONTINUE.

2. AT "MAIN" MENU, PUSH F1 KEY TO SEND Z AXIS TO ITS MECHANICAL ORIGINS (NOTE, OPERATOR MUST DO THIS FOR EACH & EVERY SPARKING JOB BEFORE SET-UP A WORKPIECE AND ALIGN ELECTRODE.

3. ALGIN YOUR ELECTRODE AND SET-UP YOUR WORKPIECE BY USING F2 - F7 KEYS.

4. CLOSE THE WORKTANK DOOR, AND IF YOU WANT TO EDIT YOUR SPARKING PROGRAM NOW, PUSH F8 KEY (EDITOR) TO ENTER "EDITOR" PAGE.

5. IN THIS "EDITOR" PAGE, YOU HAVE 2 CHOICES TO EIDTING YOUR SPARKING PROGRAM.
   a. BY PUSHING F1 KEY (EDIT Z), YOU CAN ENTER INTO MANUAL EDITING WHICH YOU HAVE TO FILLL-IN ALL SPARKING PARAMETERS VALUE ONE BY ONE MANUALLY.
   b. BY PUSHING F8 KEY (AUTO Z SET), YOU CAN ENTER INTO AUTO EDITING WHICH IN-BUILT SYSTEM WILL GIVE OPERATOR FULL SPARKING PARAMETERS VALUE (ROUGH TO FINE) AUTOMATICALLY, IF OPERATOR KEY-IN TOTAL SPARKING DEPTH & MAXIMUM STARTING CURRENT OUTPUT VALUE. NOTE, ALL PARAMETERS VALUS ARE CHANGEABLE, JUST MOVE CURSOR TO THE FIGURE THAT YOU WISH TO CHANGE AND KEY-IN NEW FIGURE (OR VALUE) AND PUSH ↵ ENTER KEY.

6. AFTER EDITING A PROGRAM, IF YOU WISH TO MEMORIED THIS PROGRAM INTO FILE LIST FOR FUTURE USE.
   YOU CAN USE F4 KEY (SAVE FILE) OF EDITOR PAGE TO SAVE THIS PROGRAM INTO FILE LIST.

7. YOU CAN START TO SPARKING NOW. (BY PUSHING F9 KEY "DISCHARGE" AT "MAIN" PAGE) BUT IF YOU WISH TO FILL UP WORKTANK WITH DIELECTRIC FLUID TO A CERTAIN LEVEL, PUSH "N" KEY SO THAT PUMP MOTOR CAN SUPPLY DIELECTRIC FLUID IMMEDIATELY. AFTER FLUID LEVEL REACH PRE-SET HEIGHT AND THEN PUSH ON F9 KEY AT "MAIN" MENU.

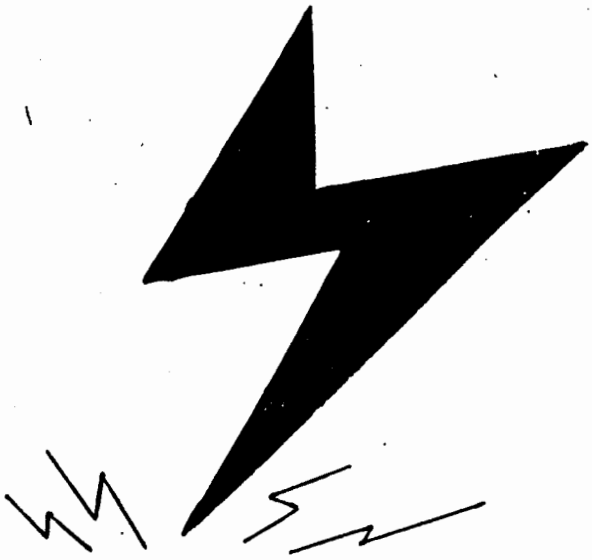
8. DURING SPARKING, OPERATOR CAN CHANGE PARAMETERS VALUE (EXCEPT THE DEPTH) OF PRESENTLY SPARKING STEP (CH) ON SCREEN. SEE DETAILS ON "CONDITION" PAGE.

VERY IMPORTANT:

**** DURING SET-UP WORKPIECE OR DURING SPARKING, WHENEVER SCREEN DISPLAY SHOWS " Z AXIS SHORT CIRCUIT "AND BUZZER SOUNDS, WHICH MEANS ELECTRODE & WORKPIECE SHORT CIRCUITED AND RAM CAN NOT BE MOVED UPWARD BY PUSHING "UP" KEY. THE ONLY WAY TO LIFT UP ELECTRODE FROM WORKPIECE IS: FIRSTLY PUSH "S/C" KEY AND STAY PUSHING, THEN PUSH "UP" KEY. (NOTE, WHEN USING S/C KEY, DO NOT / DO NOT PUSH "DOWN" KEY BECAUSE SHORT CIRCUIT PROTECTION IS OFF WHEN PUSHING S/C KEY, SO ELECTRODE WILL MOVE DOWN WITHOUT STOP TO HIT WORKPIECE VERY HARD AND DAMAGE BOTH).

**** DURING SPARKING, IF OPERATOR WISHED TO INCOOPERATE ARC PROTECTION FUNCTION, PLEASE PUSH ON "U" KEY (ARC ADJ). THE ARC PROTECTION CIRCUIT WILL SHUT OFF SPARKING FUNCTION WHENEVER HEAVY ARC ACCUMULATING TO A PRE-SET CONDITIONS. (ARC PROTECTION CIRCUIT WERE DESIGNED TO GET RIDE OF ARC AUTOMATICALLY WHEN IT HAPPENS, HOWEVER, IF ARCING CAN NOT BE ELIMINATED BY THE CIRCUITS AND ACCUMULATING TO A CERTAIN LEVEL AND TIME, IN ORDER TO PROTECT WORKPIECE & ELECTRODE, THE CIRCUITS WILL SHUT OFF SPARKING AUTOMATICALLY).

DISCHARGE DATA



**** TESTTING DATA OF DISCHARGING ****

ELECTRODE : COPPER (+)
WORKPIECE : S45C STEEL (-)
DIAMETER : Φ16mm
DEPTH : 1mm
FLUSHING : 0.7kg/cm

GAP VOLT : 50V
JMP LENGTH : 5
WORKING TIME : 7
POLARITY : 0 (+/-)
DIELECTRIC FLUID : MENTOR

CURRENT (A)	ON-TIME (u S)	OFF-TIME *10%	HV (V)	SURFACE FINISH u mRa	2*GAP (mm)	ELECTRODE WEAR %	CUTTING SPEED g/MIN
0	2	2	2	0.587	0.01	3	0.00026
0	6	2	2	0.742	0.01	1.5	0.0011
0	12	2	2	1.095	0.01	< 1	0.00096

DATA TESTTED BY : MITUTOYO SUFTEST-211
TEST LENGTH : 3.2mm

ELECTRODE : COPPER (+)
WORKPIECE : S45C STEEL (-)
DIAMETER : Φ16mm
DEPTH : 1mm
FLUSHING : 0.7kg/cm

GAP VOLT : 50V
JMP LENGTH : 5
WORKING TIME : 7
POLARITY : 0 (+/-)
DIELECTRIC FLUID : MENTOR

CURRENT (A)	ON-TIME (u S)	OFF-TIME *10%	HV (V)	SURFACE FINISH u mRa	2*GAP (mm)	ELECTRODE WEAR %	CUTTING SPEED g/MIN
1	12	2	2	1.065	0.06	6.6	0.0043
1	25	4	2	1.295	0.07	0.1	0.0019
1	50	4	2	1.352	0.08	< 0.1	0.0014
1	100	4	2	1.466	0.10	< 0.1	0.0009
1	200	4	2	1.580	0.13	< 0.1	0.0004
1	400	4	2	1.694	0.17	< 0.1	0.0001

DATA TESTTED BY : MITUTOYO SUFTEST-211
TEST LENGTH : 3.2mm

**** TESTTING DATA OF DISCHARGING ****

ELECTRODE : COPPER (+)
WORKPIECE : S45C STEEL (-)
DIAMETER : Φ16mm
DEPTH : 10mm
FLUSHING : 0.7kg/cm

GAP VOLT : 50V
JMP LENGTH : 5
WORKING TIME : 20
POLARITY : 0 (+/-)
DIELECTRIC FLUID : MENTOR

CURRENT (A)	ON-TIME (u S)	OFF-TIME *10%	HV (V)	SURFACE FINISH u mRa	2*GAP (mm)	ELECTRODE WEAR %	CUTTING SPEED g/MIN
5	25	7	2	3.215	0.1	1.4	0.043
5	50	7	2	3.502	0.11	0.5	0.024
5	100	7	2	3.520	0.14	0.2	0.020
5	200	7	2	3.538	0.18	0.1	0.018
5	400	7	2	3.556	0.24	< 0.1	0.016
5	800	7	2	3.574	0.31	< 0.1	0.014

DATA TESTTED BY : MITUTOYO SUFTEST-211
TEST LENGTH : 3.2mm

ELECTRODE : COPPER (+)
WORKPIECE : S45C STEEL (-)
DIAMETER : Φ16mm
DEPTH : 10mm
FLUSHING : 0.7kg/cm

GAP VOLT : 50V
JMP LENGTH : 5
WORKING TIME : 20
POLARITY : 0 (+/-)
DIELECTRIC FLUID : MENTOR

CURRENT (A)	ON-TIME (u S)	OFF-TIME *10%	HV (V)	SURFACE FINISH u mRa	2*GAP (mm)	ELECTRODE WEAR %	CUTTING SPEED g/MIN
10	25	7	2	4.410	0.14	2.14	0.114
10	50	7	2	4.985	0.15	1.7	0.167
10	100	7	2	6.402	0.18	1.6	0.116
10	200	7	2	7.819	0.21	1.5	0.065
10	400	7	2	9.236	0.26	1.4	0.024
10	800	7	2	10.653	0.29	1.3	0.016

DATA TESTTED BY : MITUTOYO SUFTEST-211
TEST LENGTH : 3.2mm

**** TESTTING DATA OF DISCHARGING ****

ELECTRODE : COPPER (+)
WORKPIECE : S45C STEEL (-)
DIAMETER : Φ16mm
DEPTH : 10mm
FLUSHING : 0.7kg/cm

GAP VOLT : 50V
JMP LENGTH : 5
WORKING TIME : 20
POLARITY : 0 (+/-)
DIELECTRIC FLUID : MENTOR

CURRENT (A)	ON-TIME (u S)	OFF-TIME *10%	HV (V)	SURFACE FINISH u mRa	2*GAP (mm)	ELECTRODE WEAR %	CUTTING SPEED g/MIN
15	50	7	2	5.310	0.16	3.0	0.250
15	100	7	2	6.992	0.21	1.7	0.235
15	200	7	2	7.977	0.25	0.7	0.191
15	400	7	2	8.962	0.29	0.3	0.147
15	800	7	2	9.862	0.34	0.1	0.103

DATA TESTTED BY : MITUTOYO SUFTEST-211
TEST LENGTH : 3.2mm

ELECTRODE : COPPER (+)
WORKPIECE : S45C STEEL (-)
DIAMETER : Φ16mm
DEPTH : 10mm
FLUSHING : 0.7kg/cm

GAP VOLT : 50V
JMP LENGTH : 5
WORKING TIME : 20
POLARITY : 0 (+/-)
DIELECTRIC FLUID : MENTOR

CURRENT (A)	ON-TIME (u S)	OFF-TIME *10%	HV (V)	SURFACE FINISH u mRa	2*GAP (mm)	ELECTRODE WEAR %	CUTTING SPEED g/MIN
20	50	7	2	6.275	0.21	5.80	0.330
20	100	7	2	8.585	0.24	1.00	0.380
20	200	7	2	9.085	0.26	0.43	0.350
20	400	7	2	9.585	0.31	0.20	0.320
20	800	7	2	10.085	0.36	0.10	0.290

DATA TESTTED BY : MITUTOYO SUFTEST-211
TEST LENGTH : 3.2mm

***** TESTTING DATA OF DISCHARGING *****

ELECTRODE : COPPER (+)
WORKPIECE : S45C STEEL (-)
DIAMETER : Φ32mm
DEPTH : 10mm
FLUSHING : 0.7kg/cm

GAP VOLT : 50V
JMP LENGTH : 5
WORKING TIME : 20
POLARITY : 0 (+/-)
DIELECTRIC FLUID : MENTOR

CURRENT (A)	ON-TIME (u S)	OFF-TIME *10%	HV (V)	SURFACE FINISH u mRa	2*GAP (mm)	ELECTRODE WEAR %	CUTTING SPEED g/MIN
30	50	6	2	9.682	0.24	8.6	1.098
30	100	7	2	11.430	0.28	3.18	1.155
30	300	7	2	12.195	0.43	1.20	0.958
30	500	7	2	12.960	0.52	0.60	0.860
30	700	7	2	13.755	0.58	0.40	0.770
30	900	7	2	14.515	0.64	0.20	0.680

DATA TESTTED BY : MITUTOYO SUFTEST-211
TEST LENGTH : 10mm

ELECTRODE : COPPER (+)
WORKPIECE : S45C STEEL (-)
DIAMETER : Φ32mm
DEPTH : 10mm
FLUSHING : 0.7kg/cm

GAP VOLT : 50V
JMP LENGTH : 5
WORKING TIME : 20
POLARITY : 0 (+/-)
DIELECTRIC FLUID : MENTOR

CURRENT (A)	ON-TIME (u S)	OFF-TIME *10%	HV (V)	SURFACE FINISH u mRa	2*GAP (mm)	ELECTRODE WEAR %	CUTTING SPEED g/MIN
40	75	7	2	14.155	0.26	9.40	1.652
40	150	7	2	17.447	0.38	5.80	1.385
40	300	7	2	18.505	0.50	2.50	1.264
40	500	7	2	19.563	0.61	1.50	1.200
40	700	7	2	20.621	0.70	1.00	1.150
40	900	7	2	21.679	0.75	< 1.00	1.099

DATA TESTTED BY : MITUTOYO SUFTEST-211
TEST LENGTH : 10mm

**** TESTTING DATA OF DISCHARGING ****

ELECTRODE : COPPER (+)
WORKPIECE : S45C STEEL (-)
DIAMETER : Φ32mm
DEPTH : 10mm
FLUSHING : 0.7kg/cm

GAP VOLT : 50V
JMP LENGTH : 5
WORKING TIME : 20
POLARITY : 0 (+/-)
DIELECTRIC FLUID : MENTOR

CURRENT (A)	ON-TIME (u S)	OFF-TIME *10%	HV (V)	SURFACE FINISH u mRa	2*GAP (mm)	ELECTRODE WEAR %	CUTTING SPEED g/MIN
50	100	7	2	18.230	0.38	11.5	1.979
50	300	7	2	19.500	0.52	3.8	1.608
50	500	7	2	20.770	0.64	1.2	1.483
50	700	7	2	22.040	0.76	1.0	1.421
50	900	7	2	23.310	0.80	0.9	1.359

DATA TESTTED BY : MITUTOYO SUFTEST-211
TEST LENGTH : 10mm

ELECTRODE : COPPER (+)
WORKPIECE : S45C STEEL (-)
DIAMETER : Φ32mm
DEPTH : 10mm
FLUSHING : 0.7kg/cm

GAP VOLT : 50V
JMP LENGTH : 5
WORKING TIME : 20
POLARITY : 0 (+/-)
DIELECTRIC FLUID : MENTOR

CURRENT (A)	ON-TIME (u S)	OFF-TIME *10%	HV (V)	SURFACE FINISH u mRa	2*GAP (mm)	ELECTRODE WEAR %	CUTTING SPEED g/MIN
75	100	7	2		0.72	14.50	3.325
75	300	7	2		0.88	6.50	2.428
75	500	7	2		0.96	2.30	2.343
75	700	7	2		1.06	1.90	2.188
75	900	7	2		1.10	1.30	2.000

DATA TESTTED BY : MITUTOYO SUFTEST-211
TEST LENGTH : 10mm

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