

Operating Instructions

DFB

DFB-1412-MVP
DFB-1433-MVP

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FOREWORD

This operation manual covers the operation of the control unit for the DFB-1412/1433-MVP... The control unit is generally classified into the following three sections.

1. Control box

The control section includes a microcomputer. Programs can be key inputted, stored in the computer and executed.

2. Driver

The driver receives instructions from the microcomputer in the control box and powers the stepping motor to drive the spreader.

3. Mechanical box (mechanical section)

This unit drives the spreader using the stepping motor. It also includes sensors to monitor conditions of the spreader.

The above three units are related to each other as shown below.

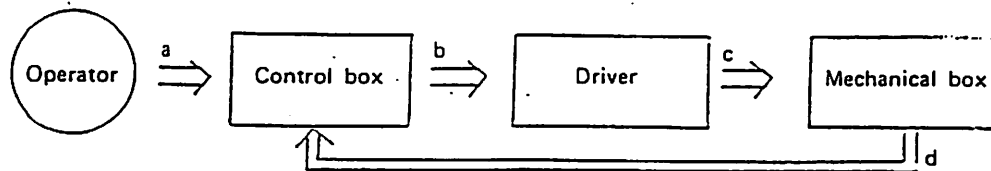


Fig. 1

- a. Operator stores pattern programs, or teaches the desired patterns in the microcomputer in the control box.
- b. The control box transmits instructions given by operator as shown by a in the above illustration to the driver to control the stepping motor installed in the mechanical box.
- c. By instruction at step b in the illustration, the driver powers the stepping motor.
- d. After energizing, the rotation of the stepping motor is converted into spreader movement. The movement state is always monitored for improper operation by the control box.

The above is the general description of this control box. Since the driver and the mechanical box were adjusted before shipment, the operation of the control box is mainly described in this operation manual.

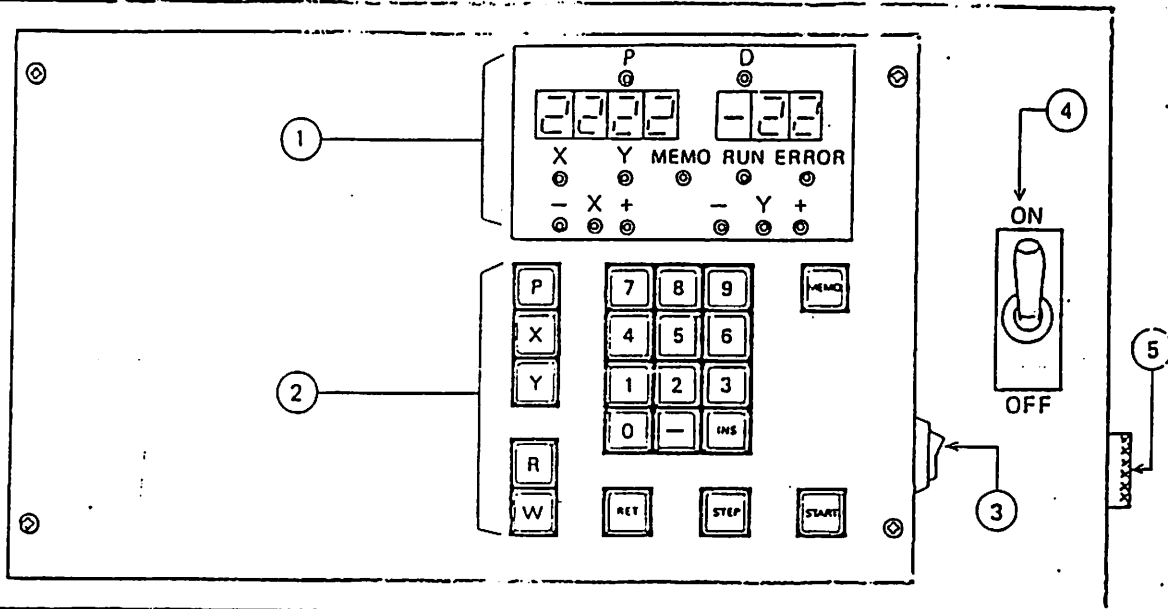


Fig. 2

① Display panel

1. P (red lamp) Lights when a pattern number (address) is set to input a pattern program, or to call a pattern number (address) to execute a program.
2. D (red lamp) Lights when a pattern number (address) is set in the memory mode (mode to input program in the memory), and indicates that program data writing in the memory is ready.
3. Number (4-digit) This section displays pattern numbers (addresses). Pattern numbers of 0001 ~ 1999 can be used. The data for stepping motor speed is inputted to number 2000. Number 0000 is not used.
4. Number (3-digit) This section displays program data. When data is key inputted, the input data is displayed. Numbers from -15 to +15 can be used as data. Numbers smaller than -15 or greater than +15 cannot be inputted and are regarded as errors.
5. X, Y (red lamps) The upper spreader is called X and the lower spreader is called Y. After pressing the corresponding keys, set the pattern number (address) to be called. When or key is pressed, the corresponding lamp lights, and goes off after pattern number (address) setting.
6. MEMO (red lamp) Lights in the memory mode (mode to input data in the memory).
7. RUN (red lamp) Lights when the sewing machine is operational.
8. ERROR (red lamp) Lights when an error is detected by the error check function. Beep sound is generated.
9. - X + (red lamp) - Y + Indicates the positional states of the X and Y spreaders. When the spreader traverses beyond the moving range, the corresponding - or + lamp lights. When the spreader is at the center (origin), the X or Y lamp lights.

② Input/output keys

1. **P** Used to call pattern numbers (addresses). This key corresponds to P lamp on the display panel. When this key is pressed again, pattern number call is canceled.
2. **X**, **Y** Used to input numbers of patterns to be formed by the upper/lower (X, Y) spreaders. First press **X** or **Y** key and then enter the desired pattern number.
3. **R**, **W** Used to write/read programs on/from cassette tape. (a cassette deck is optional).
4. **MEMO** Used to select the memory mode. When this key is pressed again, the memory mode is canceled. This key corresponds to the MEMO lamp on the display panel.
5. **RESET** Used to cancel erroneous key entry or to clear all key entries. (Pattern programs inputted are not cleared.) In other words, when this key is pressed the unit reverts immediately to the state after power ON.
6. **Number**, **-**, **INS** Used to input pattern numbers and program data. When **-** key is pressed once, the sign is inverted (when no sign is indicated, the sign is regarded as +). After pressing number keys and a sign key, press **INS** key. When **INS** key is pressed, the displayed pattern number (address) and the program data are inputted to the microcomputer. If **INS** key is not pressed, the pattern number and the program data are just displayed on the panel.
7. **RET** Used to automatically return the spreaders to the origin (start position). When this key is pressed, first the X (upper) spreader returns to the origin and then the Y (lower) spreader returns to the origin. If the above operation is not performed, the microcomputer will not operate, even if **STEP** and **START** keys are pressed.
8. **START** After setting the desired pattern using **X**, **Y** and number keys, and returning the spreaders by pressing **RET** key, press **START** key. The microcomputer becomes operational. When the sewing machine is operated, the spreaders start traversing in synchronization with the sewing machine operation to form a pattern designated by **X** and **Y** keys.
9. **STEP** When this key is pressed after **START** key is pressed, the pattern program set by **X** and **Y** keys is executed step by step without operating the sewing machine. This key is used to check programs.

③ Power switch

This is a power switch only for the microcomputer. When this switch is turned on, the panel indicates the following numbers.

2 2 2 2 **- 2 2**

④ ⑤ Stepping motor power switch and indication lamp

This is a power switch for the spreader driving stepping motor. When ON, the indication lamp lights, and the spreader is locked by the motor and thus cannot be moved by hand. When OFF, the spreader can easily be moved by hand.

2. PATTERN PROGRAM PREPARATION AND INPUT PROCEDURE

This control unit includes memory devices which can store up to 1999 steps of a pattern program. Assuming that a pattern length with this system is the same as that of the cam system (since the pattern length with the cam system has up to 12 steps) patterns corresponding to 153 cams ($1999 / (12 + 1) \approx 153$) can be memorized. Furthermore, with the cam system, one cam is used for a pattern which needs only 2 ~ 6 stitches. When this matter is taken into consideration, this memory system would actually correspond to the cam system having 200 cams. In addition, with the cam system, the pattern length is normally 12 steps (16 ~ 18 steps with a special cam), and it is almost impossible to produce cams exceeding this limit. However, this control unit can produce a pattern with up to 1999 stitches. This amounts to the pattern of approximately four meters when one stitch corresponds to 2 mm.

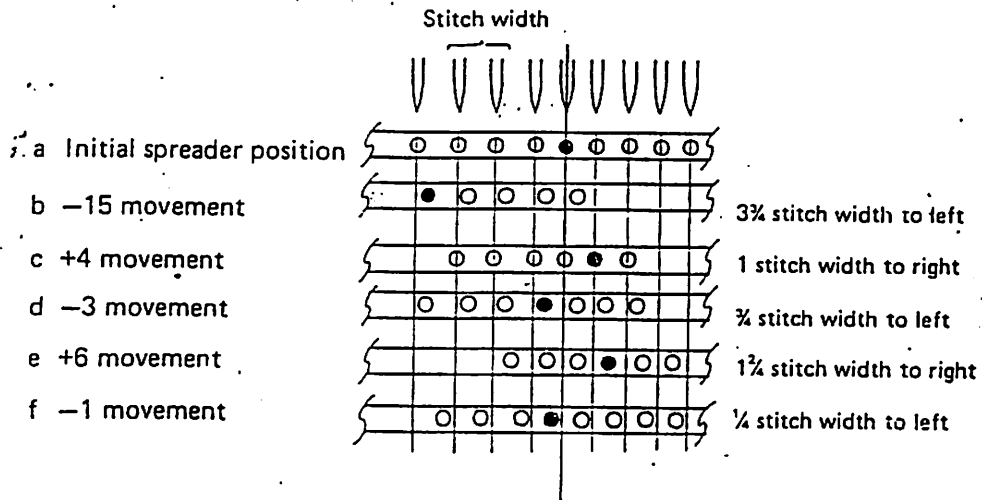
The program once memorized is retained by battery back-up for approximately 10 to 20 days even after power is turned off.

2-1. Numbers to be inputted

Numbers from -15 to +15 can be used for preparation of pattern programs. - and + indicates the direction of movement of the respective spreader. When - corresponds to the left movement of the spreader, + corresponds to the right movement. (Two spreaders, X and Y, are available and traverse in opposite directions. Right and left directions can be selected as desired.) Numbers represent the movement length of the spreader and are described below.

- 1 → ¼ stitch width
- 4 → 1 stitch width
- 15 → 3¼ stitch width

The summary of the above description is given below.



* Operations from b to f are respectively based on a.

Fig. 3

2-2 Pattern number (address)

When preparing pattern programs, serial numbers are allocated to each program code (number) from -15 to +15 described in 2-1) for convenience when program codes are stored in the memory. The number is called "address" and the program code is called "data."

| Address (pattern number) | Data (code) |
|--------------------------|-------------|
| 0001 | -15 |
| 0002 | +15 |
| 0003 | -8 |
| 0004 | +6 |
| 0005 | +2 |

Assuming that a program is composed of addresses from 0001 to 0005, the first address number 0001 determines the pattern number of the program. Accordingly, when another program is prepared, its address begins with 0006 and its pattern number is 0006.

2-3 Pattern program

A major feature of this unit allows the operator to program his own patterns. Examples of the programming procedure are given below.

(Example) 3 2 1 0 1 2 3 4

| Stitch | Address | Data | |
|--------|---------|------|--|
| 1 | 0001 | +4 | By data +4, the spreader hole moves to 1 \bullet , but decorative thread cannot be caught by the needle at 1x. |
| 2 | 0002 | +4 | By data +4, the spreader moves to 2 \bullet , and decorative thread is caught between 1x and 2x. |
| 3 | 0003 | +4 | Identical to operation described in 2 |
| 4 | 0004 | +4 | Identical to operation described in 3 |
| 5 | 0005 | -8 | By data -8, the spreader returns to 5 \bullet , and decorative thread is caught at 5 Δ between 4x and 5x. |
| 6 | 0006 | -4 | Operations 1 ~ 5 are repeated hereafter. |
| 7 | 0007 | -4 | |
| 8 | 0008 | -4 | |
| 9 | 0009 | -4 | |
| 10 | 0010 | -4 | |
| 11 | 0011 | -4 | |
| 12 | 0012 | +8 | |
| 13 | 0013 | +4 | |
| 14 | 0014 | +4 | |
| 15 | 0015 | +80 | End mark indicating program end |
| 16 | 0016 | | |
| 17 | | | |

• Spreader hole position
 x Needle placement position
 — Desired pattern
 --- Actual trace of decorative thread
 Δ Decorative thread position caught by needle thread

(Center)

Table 1

- *1 +80 is the end mark indicating program end. When this data is read, the microcomputer operation automatically returns to the first address 0001 and repeats the operation.
- *2 The spreader hole position at the start and the end (position before +80) must be on the same needle path. In other words, the sum of + data must be equal to the sum of - data. Otherwise, a program error results.

Step 1. Determination of first address (pattern number)

For the first program, 0001 can be used as the first address. When a program is written after several other programs, the first address of the new pattern is the address next to the last address of the immediately previous program, where +80 is written.

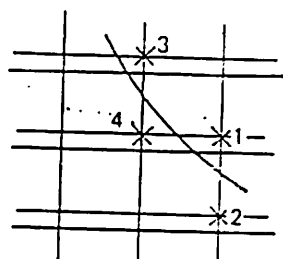
| Address | Data |
|---------|------|
| 0123 | +3 |
| 0124 | -4 |
| 0125 | -2 |
| 0126 | +6 |
| 0127 | +80 |
| 0129 | → |

○ Previous data
 ○ End mark of the previous program
 ○ First address of the program to be made

Table 2

Step 2. Write the desired pattern on the program chart. See the example.

In this case, make a drawing so that the decorative thread passes through the area between the needle placement (x mark) and the next needle placement (next x mark).



Pattern passes between x1 and x2 and x3 and x4.

Fig. 4

Step 3. Write the actual swing amount of the decorative thread, that is, the movement of the spreader hole, to make the pattern drawn in step 2.

See • and - - - - marks on the example.

Step 4. Write the addresses of the program made in steps 2 and 3, step by step, in the program chart. Then read the data from the chart and write them to the addresses.

See the example.

Step 5. After programming, write +80 at the next address to notify the microcomputer of the program end. The above description is the programming procedure. As can be seen from the example, when the decorative thread is shifted from left to right or from right to left, the spreader movement length must be approximately twice previous distance but in the opposite direction. Typical pattern programs are attached at the end of this manual. Understand these programs by carefully examining the program examples and procedures.

2-4 Program input procedure

The pattern program made in 2-3 is inputted to the microcomputer in the control box as described below.

- o Program to be inputted

| Address | Data |
|--------------------------|------|
| 1013 | +4 |
| 1014 | +4 |
| *1015 is pattern number. | +4 |
| 1016 | -8 |
| 1017 | -4 |
| 1018 | -4 |
| 1019 | -4 |
| 1020 | +8 |
| 1021 | +80 |

Table 3

Step 1 Call address 1013

| Key operation | Red lamp indication | Address | Data |
|---------------|---------------------|---------|-------|
| MEMO | MEMO | 2 2 2 2 | - 2 2 |
| P | MEMO P | 2 2 2 2 | - 2 2 |
| 1 0 1 3 | MEMO P | 1 0 1 3 | 0 0 |
| INS | MEMO D | 1 0 1 3 | ? ? ? |

Table 4

When **INS** key is pressed; address 1013 is called, and the data stored in address 1013 is displayed. This data is not relevant because the data appeared at random when power was turned on or from the data previously inputted. When data was previously input to address 1013, before the battery back-up period of approximately two weeks expire, that data is displayed.

Step 2 Data input

After step 1, perform the following operations. Input data at addresses beginning with the address 1013.

| Key operation | Red lamp indication | Address | Data |
|---------------|---------------------|---------|------|
| 0 4 | | 1 0 1 3 | 0 4 |

If "-" code is attached to the data figure when **INS** key is pressed in step 1, press **-** key to cancel the "-" code.

| | | | |
|----------|--------|---------|-------|
| - | MEMO D | 1 0 1 3 | - ? ? |
| | MEMO D | 1 0 1 3 | ? ? ? |

| | | | |
|------------|--------|---------|-------|
| INS | MEMO D | 1 0 1 4 | ? ? ? |
|------------|--------|---------|-------|

When **INS** key is pressed, data "04" is inputted to the memory, and address 1013 automatically changes to 1014. The system then waits for data input to address 1014. The data displayed at this time is not relevant.

| | | | |
|------------|--------|---------|-------|
| 0 4 | MEMO D | 1 0 1 4 | 0 4 |
| INS | MEMO D | 1 0 1 5 | ? ? ? |

Input data sequentially in the same manner.

| | | | |
|-------------|--------|---------|-------|
| 8 0 | MEMO D | 1 0 2 1 | 8 0 |
| INS | MEMO D | 1 0 2 2 | ? ? ? |
| MEMO | | 2 2 2 2 | - 2 2 |

When **MEMO** key is pressed, data input is completed, and the first state is restored.

Table 5

Many programs can be inputted to the microcomputers with the above procedure. Note the first address of each program as the pattern number.

2-5 Program check and correction

| | | | | | | | | | | | | |
|-----|---|---|---|---|---|---|---|---|---|---|---|---|
| P | 1 | 0 | 1 | 3 | P | 2 | 2 | 2 | 2 | - | 2 | 2 |
| INS | | | | | P | 1 | 0 | 1 | 3 | - | 2 | 2 |
| P | | | | | | 1 | 0 | 1 | 3 | | 0 | 4 |
| INS | | | | | | 1 | 0 | 1 | 3 | | 0 | 4 |
| INS | | | | | | 1 | 0 | 1 | 4 | | 0 | 4 |
| | | | | | | 1 | 0 | 1 | 5 | | 0 | 4 |

Each time **INS** key is pressed, the address advances to the next address, and the corresponding address data is displayed. Through this operation, data can be checked in the sequence of addresses. When the address to be checked is known regardless of the address sequence, press keys **P** **1** **0** **1** **6** **INS**. At this time, address 1016 and the corresponding data are displayed.

1 0 1 6 - 0 8

To correct an error detected by the above operation, call the address where the error is present by step 1 in 2-4.

MEMO **P** **1** **0** **1** **7** **INS** MEMO D 1 0 1 7 - 0 3

When data "-03" must be corrected to "-04", input "-04".

- **0** **4** **INS** MEMO D 1 0 1 8 - 0 4

Through the above operation, the correct data "-04" is written in address 1017, and the address advances to the next address, 1018.

Table 6

3. CONTROL UNIT OPERATION

By following the programming procedure and the input procedure as described in 2-1 to 2-5, a pattern program is written in the microcomputer. Pattern forming procedure is described below by calling the pattern program written in the microcomputer and by actually operating the sewing machine.

3-1 Pattern call-up

The first program address of the desired pattern is used to call the pattern. This first address is called pattern number and used for pattern identification. When the pattern number of the desired pattern made by the X (upper) spreader is 0100, and the pattern number for the Y spreader is 1150, operate as follows.

| | | | |
|---------|---|---------|-------|
| X | X | 0 0 0 0 | 0 0 |
| 0 1 0 0 | X | 0 1 0 0 | 0 0 |
| INS | | 0 1 0 0 | - 1 2 |

Data "-12" at address 0100 is displayed and pattern number 0100 is called to X. This completes call-up. Call-up to Y is done in the same way.

| | | | |
|---------|---|---------|-----|
| Y | Y | 0 0 0 0 | 0 0 |
| 1 1 5 0 | Y | 1 1 5 0 | 0 0 |
| INS | | 1 1 5 0 | 1 0 |

Table 7

3-2 Sewing machine start

The pattern numbers of the desired patterns to be made by the X and Y spreaders are called as described in 3-1. Next, sewing machine start procedure is described below.

| | | | |
|-----|------|---------|-----|
| RET | X, Y | 1 1 5 0 | 1 0 |
|-----|------|---------|-----|

When **RET** key is pressed, the spreaders automatically return to the origin (center). If the spreaders are not at the origin, the controller will not start and the spreaders remain stationary. Only the sewing machine operates.

| | | | |
|-------|-----|---------|-----|
| START | RUN | 1 1 5 0 | 1 0 |
|-------|-----|---------|-----|

Press **RET** key and check return of the X and Y spreaders by monitoring ON states of the X and Y red lamps. Then press **START** key. RUN (red) lamp lights to indicate that machine start is ready.

| |
|------|
| STEP |
|------|

After pressing **START** key, press **STEP** key. The sewing machine does not operate, but the spreader moves a distance equal to one stitch of the sewing machine. When this key is pressed continuously, the spreader sequentially traverses according to the program. This key can be used for checking program and spreader movement.

| |
|------|
| R, W |
|------|

These keys are used to store programs in the memory, to load programs on cassette tape and to write programs on cassette tape to the memory. A cassette deck is optional. For details, read the operation manual attached to the deck.

Table 8

4. ERROR CHECK FUNCTION

This unit has the following error check functions:

When an error is detected, the ERROR (red) lamp lights and the buzzer sounds.

4-1 Error check at input

a. Address error

Addresses of 0001 ~ 1999 can be used by this unit.

Addresses of 0000 and 2000 are used for purposes other than programming. In other words, data cannot be written in addresses except 0000 ~ 2000.

When an address other than 0000 ~ 1999 is called by mistake at program input and pattern call-up, an error occurs, the ERROR lamp lights and the buzzer sounds. At this time, enter the correct address since the erroneously inputted address is canceled.

b. Data error

Data from -15 to +15 can be used by this unit. If data exceeding the range is inputted, an error occurs. To correct the error, enter the correct data in the same way as the above description (4-1 a.).

c. Program end check

After program data are inputted sequentially up to the end mark (+80), this program end check function determines if the spreader has returned to the start position (origin). In other words, this function checks if the absolute value of the sum of + data is equal to that of - data. If they are not equal, an error is caused. In this case, determine if the error is caused by errors in the program or by a program input mistake, and correct as per correction procedure described in 2-5.

4-2 Error check during sewing machine operation

a. Origin-check

By the function in 4-1-c, the program can be checked for return to the start origin at program end input. When a sewing machine is actually operated using a checked program, if for some reason, the spreader has not returned to the origin after one cycle of a pattern, an error occurs. The ERROR lamp lights, the buzzer sounds, and the spreader stops immediately. If an error occurs, find causes of the error by monitoring the "— X +" and "— Y +" lamps on the display panel. (see 1-1-9).

4-3 Other errors

When the spreader moves beyond the moving range, it is forcibly stopped at the limit and cannot move further. It can be moved inward to the moving range only when an inward movement instruction is first given. In this case, however, the spreader position differs from the programmed position by the distance corresponding to the forcible stop amount. As a result, the proper pattern cannot be formed, and an error is caused since the check function described in 4-2-a works at the end of one cycle.

5. ADDRESS 2000

As stated previously, no program data can be inputted at address 2000. A stepping motor speed address is inputted at this address. Normally, enter +10. The greater the figure, the slower the speed and vice-versa. Figures ranging from 8 to 12 should be used.

When this data is inputted, the data is accepted although the ERROR lamp lights due to the function described in 4-1-a.

16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

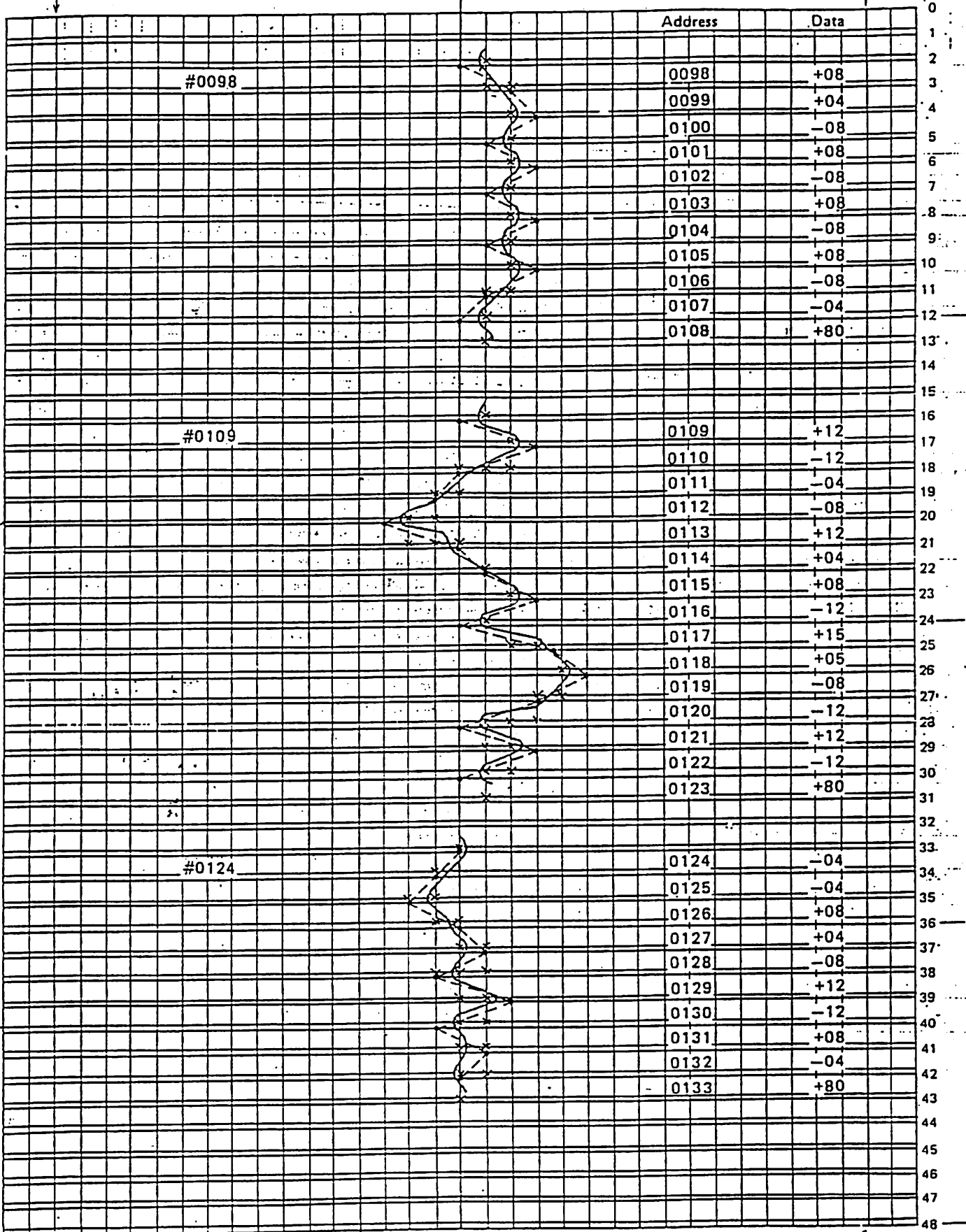
| | Address | Data |
|-------|---------|------|
| #0001 | 0001 | +08 |
| | 0002 | -08 |
| | 0003 | +80 |
| #0004 | 0004 | +04 |
| | 0005 | +04 |
| | 0006 | +04 |
| | 0007 | +04 |
| | 0008 | -08 |
| | 0009 | -04 |
| | 0010 | -04 |
| | 0011 | -04 |
| | 0012 | -04 |
| | 0013 | -04 |
| | 0014 | -04 |
| | 0015 | +08 |
| | 0016 | +04 |
| | 0017 | +04 |
| | 0018 | +80 |
| #0019 | 0019 | +04 |
| | 0020 | +04 |
| | 0021 | -08 |
| | 0022 | -04 |
| | 0023 | -04 |
| | 0024 | +08 |
| | 0025 | +80 |
| #0026 | 0026 | +08 |
| | 0027 | +04 |
| | 0028 | -08 |
| | 0029 | -04 |
| | 0030 | +80 |
| #0031 | 0031 | +12 |
| | 0032 | -12 |
| | 0033 | +80 |

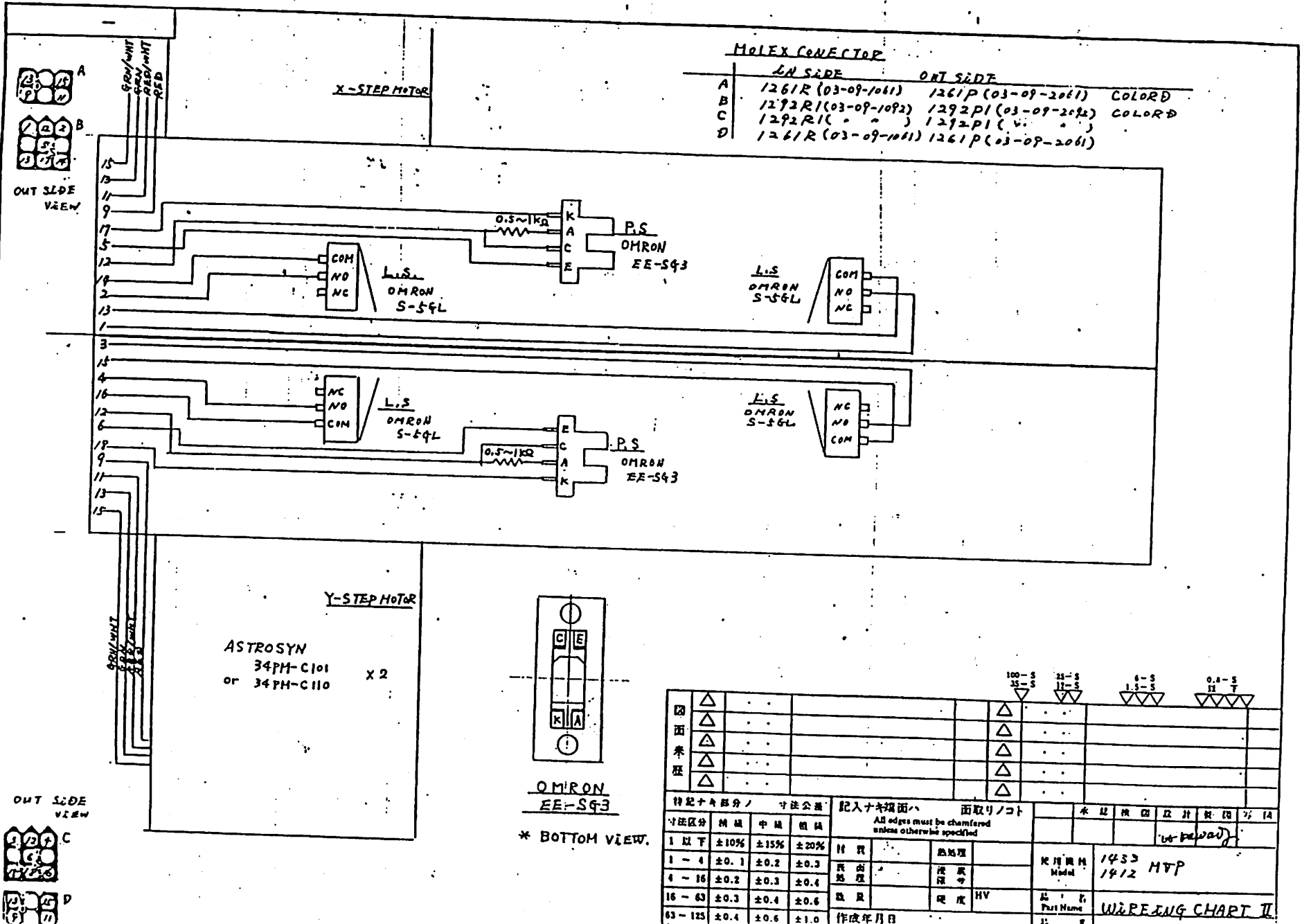
16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

| | | | | | | | | | | | | | | | | Address | Data | |
|-------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---------|------|----|
| #0034 | | | | | | | | | | | | | | | | 0034 | +04 | 0 |
| | | | | | | | | | | | | | | | | 0035 | +04 | 1 |
| | | | | | | | | | | | | | | | | 0036 | -08 | 2 |
| | | | | | | | | | | | | | | | | 0037 | +08 | 3 |
| | | | | | | | | | | | | | | | | 0038 | -08 | 4 |
| | | | | | | | | | | | | | | | | 0039 | +08 | 5 |
| | | | | | | | | | | | | | | | | 0040 | -08 | 6 |
| | | | | | | | | | | | | | | | | 0041 | -04 | 7 |
| | | | | | | | | | | | | | | | | 0042 | -04 | 8 |
| | | | | | | | | | | | | | | | | 0043 | +08 | 9 |
| | | | | | | | | | | | | | | | | 0044 | -08 | 10 |
| | | | | | | | | | | | | | | | | 0045 | +08 | 11 |
| | | | | | | | | | | | | | | | | 0046 | -08 | 12 |
| | | | | | | | | | | | | | | | | 0047 | +08 | 13 |
| | | | | | | | | | | | | | | | | 0048 | +80 | 14 |
| | | | | | | | | | | | | | | | | | | 15 |
| | | | | | | | | | | | | | | | | | | 16 |
| | | | | | | | | | | | | | | | | | | 17 |
| | | | | | | | | | | | | | | | | | | 18 |
| | | | | | | | | | | | | | | | | | | 19 |
| #0049 | | | | | | | | | | | | | | | | 0049 | +12 | 20 |
| | | | | | | | | | | | | | | | | 0050 | -08 | 21 |
| | | | | | | | | | | | | | | | | 0051 | +12 | 22 |
| | | | | | | | | | | | | | | | | 0052 | -12 | 23 |
| | | | | | | | | | | | | | | | | 0053 | +08 | 24 |
| | | | | | | | | | | | | | | | | 0054 | -12 | 25 |
| | | | | | | | | | | | | | | | | 0055 | +80 | 26 |
| | | | | | | | | | | | | | | | | | | 27 |
| | | | | | | | | | | | | | | | | | | 28 |
| | | | | | | | | | | | | | | | | | | 29 |
| | | | | | | | | | | | | | | | | | | 30 |
| #0056 | | | | | | | | | | | | | | | | 0056 | +08 | 31 |
| | | | | | | | | | | | | | | | | 0057 | +04 | 32 |
| | | | | | | | | | | | | | | | | 0058 | -08 | 33 |
| | | | | | | | | | | | | | | | | 0059 | +12 | 34 |
| | | | | | | | | | | | | | | | | 0060 | -12 | 35 |
| | | | | | | | | | | | | | | | | 0061 | +08 | 36 |
| | | | | | | | | | | | | | | | | 0062 | -08 | 37 |
| | | | | | | | | | | | | | | | | 0063 | +08 | 38 |
| | | | | | | | | | | | | | | | | 0064 | -08 | 39 |
| | | | | | | | | | | | | | | | | 0065 | -04 | 40 |
| | | | | | | | | | | | | | | | | 0066 | +80 | 41 |
| | | | | | | | | | | | | | | | | | | 42 |
| | | | | | | | | | | | | | | | | | | 43 |
| | | | | | | | | | | | | | | | | | | 44 |
| | | | | | | | | | | | | | | | | | | 45 |
| | | | | | | | | | | | | | | | | | | 46 |
| | | | | | | | | | | | | | | | | | | 47 |
| | | | | | | | | | | | | | | | | | | 48 |

| | | | | | | | | | | | | | | | | Address | Data | |
|-------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---------|------|----|
| | | | | | | | | | | | | | | | | | | 0 |
| | | | | | | | | | | | | | | | | | | 1 |
| | | | | | | | | | | | | | | | | | | 2 |
| #0067 | | | | | | | | | | | | | | | | 0067 | +04 | 3 |
| | | | | | | | | | | | | | | | | 0068 | -08 | 4 |
| | | | | | | | | | | | | | | | | 0069 | 00 | 5 |
| | | | | | | | | | | | | | | | | 0070 | -04 | 6 |
| | | | | | | | | | | | | | | | | 0071 | +08 | 7 |
| | | | | | | | | | | | | | | | | 0072 | 00 | 8 |
| | | | | | | | | | | | | | | | | 0073 | +80 | 9 |
| | | | | | | | | | | | | | | | | | | 10 |
| | | | | | | | | | | | | | | | | | | 11 |
| | | | | | | | | | | | | | | | | | | 12 |
| #0074 | | | | | | | | | | | | | | | | 0074 | +08 | 13 |
| | | | | | | | | | | | | | | | | 0075 | +08 | 14 |
| | | | | | | | | | | | | | | | | 0076 | -08 | 15 |
| | | | | | | | | | | | | | | | | 0077 | +08 | 16 |
| | | | | | | | | | | | | | | | | 0078 | -08 | 17 |
| | | | | | | | | | | | | | | | | 0079 | +08 | 18 |
| | | | | | | | | | | | | | | | | 0080 | -08 | 19 |
| | | | | | | | | | | | | | | | | 0081 | +08 | 20 |
| | | | | | | | | | | | | | | | | 0082 | -08 | 21 |
| | | | | | | | | | | | | | | | | 0083 | +08 | 22 |
| | | | | | | | | | | | | | | | | 0084 | -12 | 23 |
| | | | | | | | | | | | | | | | | 0085 | -04 | 24 |
| | | | | | | | | | | | | | | | | 0086 | +80 | 25 |
| | | | | | | | | | | | | | | | | | | 26 |
| | | | | | | | | | | | | | | | | | | 27 |
| | | | | | | | | | | | | | | | | | | 28 |
| | | | | | | | | | | | | | | | | | | 29 |
| #0087 | | | | | | | | | | | | | | | | 0087 | +13 | 30 |
| | | | | | | | | | | | | | | | | 0088 | -13 | 31 |
| | | | | | | | | | | | | | | | | 0089 | +13 | 32 |
| | | | | | | | | | | | | | | | | 0090 | +03 | 33 |
| | | | | | | | | | | | | | | | | 0091 | -08 | 34 |
| | | | | | | | | | | | | | | | | 0092 | -04 | 35 |
| | | | | | | | | | | | | | | | | 0093 | +08 | 36 |
| | | | | | | | | | | | | | | | | 0094 | +04 | 37 |
| | | | | | | | | | | | | | | | | 0095 | -08 | 38 |
| | | | | | | | | | | | | | | | | 0096 | -08 | 39 |
| | | | | | | | | | | | | | | | | 0097 | +80 | 40 |
| | | | | | | | | | | | | | | | | | | 41 |
| | | | | | | | | | | | | | | | | | | 42 |
| | | | | | | | | | | | | | | | | | | 43 |
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| | | | | | | | | | | | | | | | | | | 45 |
| | | | | | | | | | | | | | | | | | | 46 |
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16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16





| 特記寸法部分 / 寸法公差 | 記入寸法項目 | | 面取り/コト | | 水廻り | | 設計 | | 製図 | | 写 | | 1A | | |
|---------------|--------|------|--------|--|----------|--|----|--|----|--|---|-------------------|----|-----|--|
| 寸法区分 | 精 細 | 中 級 | 粗 級 | All edges must be chamfered unless otherwise specified | | | | | | | | | | | |
| 1 以下 | ±10% | ±15% | ±20% | 特 異 | 熟 地 理 | | | | | | | | | | |
| 1 - 4 | ±0.1 | ±0.2 | ±0.3 | 特 異 | 熟 地 理 | | | | | | | 1433 | | MVP | |
| 4 - 16 | ±0.2 | ±0.3 | ±0.4 | 特 異 | 熟 地 理 | | | | | | | | | | |
| 16 - 63 | ±0.3 | ±0.4 | ±0.6 | 特 異 | 熟 地 理 HV | | | | | | | 1412 | | MVP | |
| 63 - 125 | ±0.4 | ±0.6 | ±1.0 | 特 異 | 熟 地 理 HV | | | | | | | WIRE ENG CHART II | | | |

