

## AUDIO VISUAL EDUCATION

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Module IV

Duplicating Processes

Unit 2

Spirit Duplication  
-----Instructional Objectives:

1. Identify the parts of the spirit duplicator.
2. Prepare an original master copy using duplograph master sheet and hectograph carbon sheet for a given illustration.
3. State the procedure for operating the duplicator correctly.
4. List at least three precautions to be observed in using the spirit duplicator.
5. Arrange in the serial order all the operations for 'Spirit Duplication.'
6. Operate the 'Spirit Duplicator' and take five copies.

## AUDIO VISUAL EDUCATION

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Module IV

Duplicating Processes

Unit 2

Spirit Duplication  
-----INTRODUCTION:

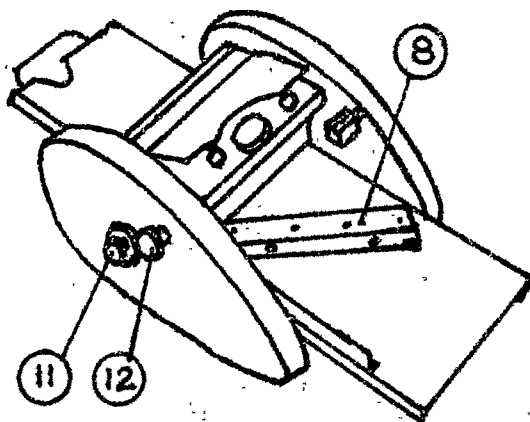
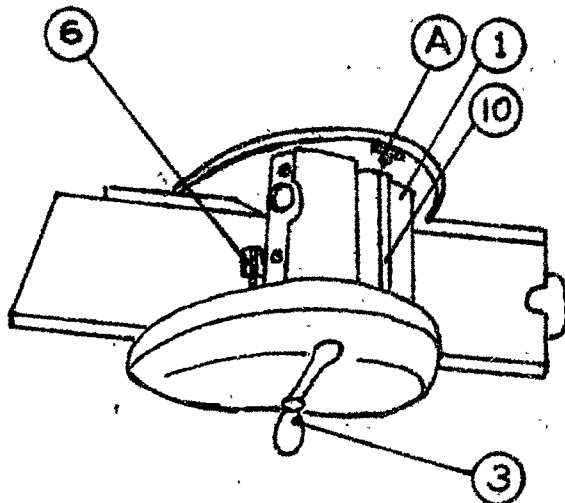
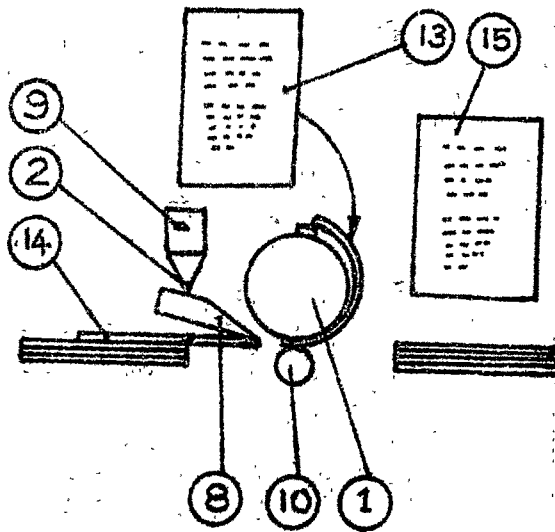
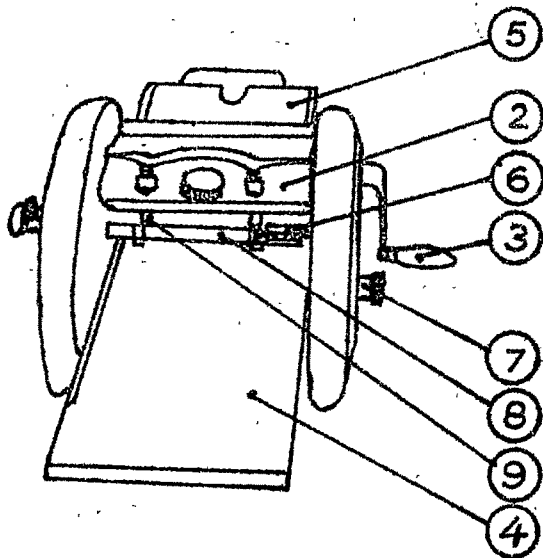
Spirit duplication or fluid hectographic process as it is also called, is cheaper to use than other processes. Lettering can be done by typewriter, hand or with stencils. Drawings can be traced or drawn. By using different coloured carbons, you can add colours to your work at little extra cost. Maximum number of copies that can be made by this process is limited to about one hundred copies. Some manufacturers advocate taking upto three hundred copies. But our experience has been that the masters fade after we take 100 copies. However this depends on quality and proper grades of

- a. master paper
- b. carbon and
- c. fluid

You must know your spirit duplicator, before you do anything further. You are strongly advised to visit the audio visual workshop and see it for yourself, after reading about the machine and then again read these pages, as this will clear lot of your doubts that may come up.

BASIC DESIGN OF SPIRIT DUPLICATOR:

The duplicator essentially consist of a drum, on which you place the master copy which is a glazed art paper, it is on which this impressions are made for transferring. On one side of the machine there is the feed tray in which the paper to be duplicated is placed, and on the other side there is receiving tray in which the duplicated copies are collected. For manual operating machines, you have the operating (crank) or handle, and when you face the handle part



### SCHEMATIC DIAGRAM

#### Parts:

1. Drum or cylinder
2. Tank
3. Operating handle
4. Feed tray
5. Receiving tray
6. Counter
7. Impression roller knob
8. Felt pad.
9. Dripper nozzle
10. Master copy holding strip
11. Top margin adjuster knob
12. Fluid flow control
13. Master copy
14. Copying paper
15. Duplicated copies
16. Impression roller
- A. Pointer guide for top adjustment

SPRIT DUPLICATOR

M IV/2-2/SB

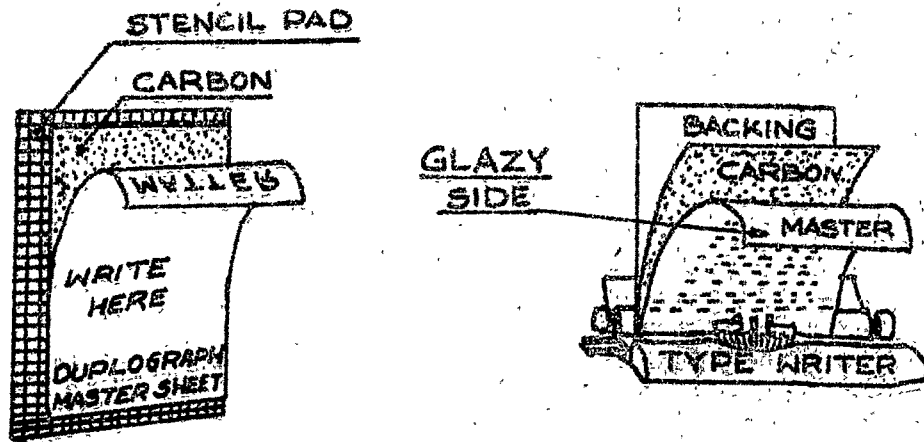
of the machine, on the left is the feed tray and on the right is the receiving tray. On the feed tray you have the impression paper and on the receiving tray, you have the copy required by you (duly) duplicated. You have the fluid tank, from which you can adjust and drip the fluid required to moisten the copy through a felt pad, which should be always kept moist while the machine is in operation. If the machine is idle for some time, the felt will be dry and need priming. If the felt is very wet, you will produce darker copies, but after run of a few copies, you may get good copies. You have the impression roller below the drum. You feed the paper manually from tray to pass between the drum and roller. During this process the spirit which comes in contact with paper transfers impression from the master on to the copy, and finally the copy is deposited on the receiving tray. A counter registers the number of copies made.

In order to use the spirit duplicator, you need in addition the master, which consist of art paper with a glazed or shiny side, a carbon and writing materials.

#### PREPARATION OF THE MASTER:

A good master is a pre-requisite for spirit duplication. The master will be prepared by the teacher. Follow the steps given here for preparing the master.

1. PREPARE MASTER PACK: The master pack consists of sheet of spirit master art paper with a glazed or shiny side, and a sheet of spirit carbon paper, with the carbon side facing the glazed surface. SO REMEMBER THAT GLAZED SIDE AND CARBON FACE EACH OTHER. A backing sheet will ensure clear, sharp copy.



2. Insert master pack into typewriter for typewritten text:

As you insert and see it in the typewriter, the master will be nearest to you, next will be carbon, facing the glazed side of the master, and last will be the backing sheet. When you type, impression will be there on the back of the master paper, because it faces the carbon. Check alignment to be certain that typing on the master will be straight across.

3. Typing will be with ribbon in normal position. Leave 1" margin at top and about 3/4" at bottom. Don't crowd typing. While you use ordinary typewriter (not electric) try for best key pressure.

4. Making corrections:

When you do make an error you have to correct the same. It is easy. Let us see how we can do this.

and t they	and [ ] they	and [ ] they
cut out or cover up or Block out		

a. Replace letters:

1. Cut with a razor blade, a sharp knife or a small scissors the portions to be removed;
2. Cover them with cellophane tape or
3. block the correction letter as shown

b. To correct errors:

1. Lightly scrape carbon with a razor blade or scalpet.
2. erase with a rubber thoroughly without smudges being seen.
3. Coat it with wax pencil.

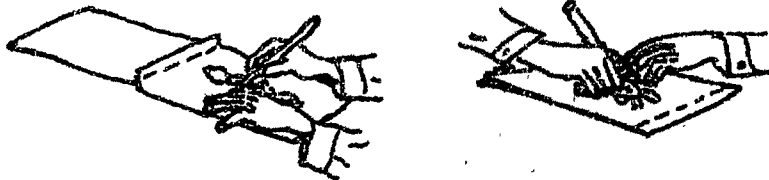


c. After eliminating the error type the correction:

Remember that you have already used up the carbon at the point of error, so new carbon will be needed there. Experts often tear a small piece of the carbon from a corner of the master for making such corrections in the place where retyping is needed. Remove this slip before going further.

- d. You may be able to adopt short cuts sometimes. For example you may simply type over letter changing c to e, h to b, i to l, n to m and so on. You may change commas, colons to semi colons etc..
- e. Adding hand written materials: Frequently teachers and students prepare spirit master completely by hand or add hand drawn materials to typed masters using these techniques. You can add interesting visuals and increase the communicative power of your spirit duplicating materials by inserting freehand drawings and lettering. For this

1. Layout the material, fold back the carbon sheet from the master sheet. Sketch your drawing or lettering lightly in pencil on the face of the master sheet.



2. Fold the carbon back under the master sheet, leaving the slip sheet out. Go over the drawing or lettering on the master using a sharp hard pencil or a ball point pen on a firm smooth surface.
- f. TRACING. When transferring illustrations, clip art, previously prepared drawings or lettering into masters.
1. Remove the slip sheet from the master
  2. Attach the material to the master sheet with tape.
  3. Trace over the lines to be reproduced with a ball point pen or pencil using firm even pressure. The impression will appear on back of the master reversed like a mirror image.
- g. To prepare part of the master in one colour and rest in other colours.

Prepare master in the regular way; but when you come to the part you wish to be in another colour, substitute a coloured carbon for the one being used.

## Module IV

## Duplicating Processes

## Unit 2

## Spirit Duplicator

OPERATING THE SPIRIT DUPLICATOR:Materials required:

1. duplicator
2. Spirit
3. Spirit master
4. Cotton
5. Copying papers

1. READY THE DUPLICATOR:

- \_\_\_\_\_ a. Remove the cover
- \_\_\_\_\_ b. Clean duplicator if required
- \_\_\_\_\_ c. Insert paper in the feed tray
- \_\_\_\_\_ d. Adjust guides and grippers if any
- \_\_\_\_\_ e. Adjust pressure of impression roller
- \_\_\_\_\_ f. Check for fluid in the tank, add if required
- \_\_\_\_\_ g. Check for moistness of felt, wet if necessary
- \_\_\_\_\_ h. Rotate and check for proper flow of fluid.

II. ATTACH MASTER

- \_\_\_\_\_ a. Turn handle to the 7 'O' clock position.
- \_\_\_\_\_ b. Rotate handle counter clockwise
- \_\_\_\_\_ c. Insert the top edge of the master into the opening (about 5 mm so that)
- \_\_\_\_\_ d. the side with carbon impression faces up
- \_\_\_\_\_ e. then rotate handle clockwise and
- \_\_\_\_\_ f. return the clamping to normal locked position.

III. RUN COPIES:

- \_\_\_\_\_ a. Run test sheet
- \_\_\_\_\_ b. Adjust margins (top, bottom)
- \_\_\_\_\_ c. Adjust impression strength
- \_\_\_\_\_ d. Check again spirit flow and adjust if needed
- \_\_\_\_\_ e. Set counter for copy numbering
- \_\_\_\_\_ f. Run copies feed paper continuously, check continuously spirit, paper and other adjustments.



#### IV. LEAVING MACHINE:

- a. stop handle to 7 'O' clock position.
- b. rotate counter clockwise, open clamp.
- c. remove master without touching the carbon impression.
- d. Rotate clockwise again, close clamp lever, leave drum to normal position.
- e. File master after stapling to it a specimen.
- f. Set copy control lever and pressure control lever to zero.
- g. Remove and store spirit.
- h. Remove and store unused paper.
- i. clean the machine.
- j. replace the dust cover.

#### SAFETY PRECAUTION:

Here are some important points for you to make sure that you dont overlook them. You are strongly advised to meticulously follow them under all circumstances.

1. Spirit is highly inflammable and poisonous too. Handle with care.
2. Most spirit fluids contain methyl alcohol. They react with skin under no circumstances should you use them to clean any part of your body. Avoid undue long exposure of the skin to them.
3. Continued breathing of methanol vapours may cause illness, do not use spirit duplicating equipment in small, poorly and ill-ventilated rooms.
4. Smoking is strictly prohibited in the vicinity of the duplicator and be away from the spirit while you smoke.

#### SUMMARY:

You can use spirit duplicator for all class room activity, say for a hundred students, of any type of instructional material with or without illustration. It is an ideal duplicating equipment for training purposes to be possessed by your institute since the copies can be made easily and quickly. M/s. Sarada Latham Business Machines, 189 Mount Road, Madras-6, market Shourie duplicators (spirit duplicators), made in India.

#### FINALE:

Now you may discuss the less among yourselves and then with the instructor. You may fix up time with your Training Officer in the Audio Visual Workshop for the operation of the machine.

Take unit test in the end.

M IV/2-8/SB

## AUDIO VISUAL EDUCATION

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Module IV

Duplicating Processes

Unit 2

Spirit Duplicator

Time: 5 minutes

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Practical Exercise No: 42

## A. PROBLEM

Preparing master for spirit duplication.

Refer to module IV, unit 2, preparation of the master, before doing this exercise.

## B. EQUIPMENT &amp; MATERIALS

1. Spirit master (art paper).
2. Spirit carbon.
3. Typewriter or writing materials.

## C. POINTS FOR GRADING

1. Neat work
2. Layout.
3. Uniformity

D. Deadline for the project: June 15th.

## AUDIO VISUAL EDUCATION

Module IV

Duplicating Processes. Time:

Unit 2

Spirit Duplication 5 mts.

Practical Exercise No. 43: Operating Spirit Duplicator

## A. PROBLEM

Using the Spirit duplicator and the prepared duplograph master, take ten copies; of an instructional hand out.

- |                                 |                     |
|---------------------------------|---------------------|
| 1. Ready the duplicator.        | Submit the jumbled  |
| 2. Attach the duplograph master | performance check-  |
| 3. Run copies                   | list after writing  |
| 4. Leave machine clean.         | the order of per-   |
|                                 | formance. Then      |
|                                 | obtain the correct  |
|                                 | checklist and       |
|                                 | follow instruction. |

## B. EQUIPMENT &amp; MATERIALS

1. Duplicator
2. Spirit.
3. Spirit master.
4. Cotton.
5. Copying papers.

## C. POINTS FOR GRADING

1. Correct operations in the order.
2. Neat and clean work.
3. Leaving machine in normal position.
4. Working without waste of materials.
5. Time

D. Deadline for the project: June 15th.

## AUDIO VISUAL EDUCATION

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Module IV

Duplicating Processes

Unit 2

Spirit Duplication  
-----

Practical Exercise NO:43: Operating Spirit Duplicator

I. READY THE DUPLICATOR:

1. Remove the cover
2. Clean duplicator if required
3. Insert paper in the feed tray
4. Adjust guides and grippers if any
5. Adjust pressure of impression roller
6. Check for fluid in the tank, add if required
7. Check for moistness of felt, wet if necessary
8. Rotate and check for proper flow of fluid

II. ATTACH MASTER

1. Turn handle to the 7'0' clock position.
2. Rotate handle counter clockwise.
3. Insert the top edge of the master into the opening (about 5 mm) so that,
4. the side with carbon impression faces up,
5. then rotate handle clockwise, and
6. return the clamping to normal locked position.

III. RUN COPIES

1. Run test sheet
2. Adjust margins (top, bottom)
3. Adjust impression strength
4. Check again spirit flow and adjust if needed
5. Set counter for copy numbering
6. Run copies feed paper continuously, check continuously spirit, paper and other adjustments.

#### IV. LEAVING MACHINE:

1. Stop handle to 7 'O' clock position.
2. Rotate counter clockwise, open clamp.
3. Remove master without touching the carbon impression
4. Rotate clockwise again, close clamp lever, leave drum to normal position.
5. File master after stapling to it a specimen.
6. Set copy control lever and pressure control lever to zero.
7. Remove and store spirit.
8. Remove and store unused paper.
9. Clean the machine
10. Replace dust cover.

## AUDIO VISUAL EDUCATION

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Module IV

Duplicating Processes

Unit 2

Spirit Duplication  
-----

Practical Exercise No:43 Operating a Spirit Duplicator.

The following check list is not in an orderly sequence.  
Number 1,2,3, ..... against each of the sub heads in the  
correct order.

I. READY THE DUPLICATOR

- \_\_\_\_\_ Adjust pressure of impression roller.
- \_\_\_\_\_ Adjust guides if any
- \_\_\_\_\_ Check for moistness of felt, wet if necessary
- \_\_\_\_\_ Insert paper in the feed tray
- \_\_\_\_\_ Rotate and check for proper flow of fluid.
- \_\_\_\_\_ Clean duplicator if required
- \_\_\_\_\_ Check for fluid in the tank, add if necessary.
- \_\_\_\_\_ Remove the cover.

II. ATTACH MASTER:

- \_\_\_\_\_ the side with carbon impression faces up
- \_\_\_\_\_ Insert the top edge of the master into the opening  
(about 5 mm)
- \_\_\_\_\_ Turn handle to 7 'O' clock position.
- \_\_\_\_\_ Return the clamping to normal locked position.
- \_\_\_\_\_ Rotate handle counter clock wise,
- \_\_\_\_\_ Then rotate handle clock wise, and

III. RUN COPIES

- \_\_\_\_\_ Run copies, feed paper continuously, check continuously  
spirit, paper and other adjustments.
- \_\_\_\_\_ Check again spirit flow and adjust if needed
- \_\_\_\_\_ Run test sheet.

- \_\_\_\_\_ Set counter for copy numbering
- \_\_\_\_\_ Adjust impression strength
- \_\_\_\_\_ Adjust margin (top and bottom)

IV. LEAVE MACHINE:

- \_\_\_\_\_ Remove and store spirit
- \_\_\_\_\_ Set copy control knob and pressure control knob to zero
- \_\_\_\_\_ Replace dust cover
- \_\_\_\_\_ Rotate clock wise again, close clamp lever, leave  
drum to normal position.
- \_\_\_\_\_ Remove and store unused paper
- \_\_\_\_\_ Stop handle to 7 'O' clock position.
- \_\_\_\_\_ Rotate counter clockwise, open clamp
- \_\_\_\_\_ File master after stapling to it a specimen
- \_\_\_\_\_ Remove master without touching the carbon impression
- \_\_\_\_\_ Clean the machine and,

## Module IV

## Duplicating Processes

Practical Exercise No. 43. Operating a spirit duplicator.

I. READY THE DUPLICATOR

- 5 Adjust pressure of impression roller.
- 4 Adjust guides if any
- 7 Check for moistness of felt, wet if necessary
- 3 Insert paper in the feed tray
- 8 Rotate and check for proper flow of fluid
- 2 Clean duplicator if required
- 6 Check for fluid in the tank, add if necessary
- 1 Remove the cover

II. ATTACH MASTER

- 4 the side with carbon impression faces up
- 3 insert the top edge of the master into the opening (about 5 mm)
- 1 Turn handle to 7 O' Clock position
- 6 return the clamping to normal locked position
- 2 rotate handle counter clock wise
- 5 then rotate handle clock wise, and

III. RUN COPIES

- 6 run copies, feed paper continuously, check continuously spirit, paper and other adjustments,
- 4 check again spirit flow and adjust if needed
- 1 run test sheet
- 5 set counter for copy numbering
- 3 adjust impression strength
- 2 adjust margin (top and bottom)

IV. LEAVE MACHINE

- 7 remove and store spirit
- 6 set copy control knob and pressure control knob to zero
- 10 replace dust cover
- 4 rotate clock wise again, close clamp lever, leave drum to normal position,



- 8 .. remove and store unused paper
- 1 stop handle to 7 'O' clock position
- 2 rotate counter clockwise, open clamp
- 5 file master after stapling to it a specimen
- 3 remove master without touching the carbon impression
- 9 clean the machine and

## CRITERION TEST

Module IV

Duplicating Processes

Unit 2

Spirit Duplication

1. The spirit duplicator is also known as
  - ☐ a. Hexographic duplicator
  - ☐ b. Hectographic duplicator
  - ☐ c. Alcohol duplicator
  - ☐ d. Carbon duplicator
2. With spirit duplicator you can run 100 copies. This depends on the quality of three consumable materials. They are
  - a. \_\_\_\_\_.
  - b. \_\_\_\_\_.
  - c. \_\_\_\_\_.
3. When the Master copy is mounted on the drum, the side facing up is
  - ☐ a. the carbon reverse image side.
  - ☐ b. the front side
  - ☐ c. the back side
  - ☐ d. positive side
4. For duplicating the copies, it is necessary to wet the
  - ☐ a. Carbon sheet
  - ☐ b. the master sheet
  - ☐ c. the copying paper
  - ☐ d. felt pad.
5. The master copy is prepared by writing on
  - ☐ a. front side of master sheet
  - ☐ b. back side of carbon sheet
  - ☐ c. on the master sheet
  - ☐ d. white side of the master sheet.
6. The carbon sheet is placed in such a manner that the carbon side is facing
  - ☐ a. yellow side of master sheet
  - ☐ b. glazed side of master sheet
  - ☐ c. away from yellow side of master sheet
  - ☐ d. away from white side of master sheet.

7. Write three safety precautions you would observe while using spirit duplicator.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

8. The procedure for operating a spirit duplicator is given below in a jumbled form under different headings. Number the operation in seriatum under each heading:

#### I. READY THE DUPLICATOR

- \_\_\_\_\_ Adjust pressure of impression roller
- \_\_\_\_\_ adjust guides if any
- \_\_\_\_\_ check for moistness of felt, wet if necessary
- \_\_\_\_\_ Place paper in the feed tray
- \_\_\_\_\_ rotate and check for proper flow of fluid.
- \_\_\_\_\_ clean duplicator if required.
- \_\_\_\_\_ check for fluid in the tank, add if necessary
- \_\_\_\_\_ remove the cover.

#### II. ATTACH MASTER:

- \_\_\_\_\_ the side with carbon impression faces up
- \_\_\_\_\_ insert the top edge of the master into the opening (about 5 mm)
- \_\_\_\_\_ Turn handle to 7 'O' clock position.
- \_\_\_\_\_ return the clamping to normal locked position.
- \_\_\_\_\_ rotate handle counter clock wise
- \_\_\_\_\_ then rotate handle clock wise, and

#### III. RUN COPIES:

- \_\_\_\_\_ run copies, feed paper continuously, check continuously spirit, paper and other adjustments.
- \_\_\_\_\_ check again spirit flow and adjust if needed.
- \_\_\_\_\_ run test sheet
- \_\_\_\_\_ set counter for copy numbering
- \_\_\_\_\_ adjust impression strength
- \_\_\_\_\_ adjust margin (top and bottom)

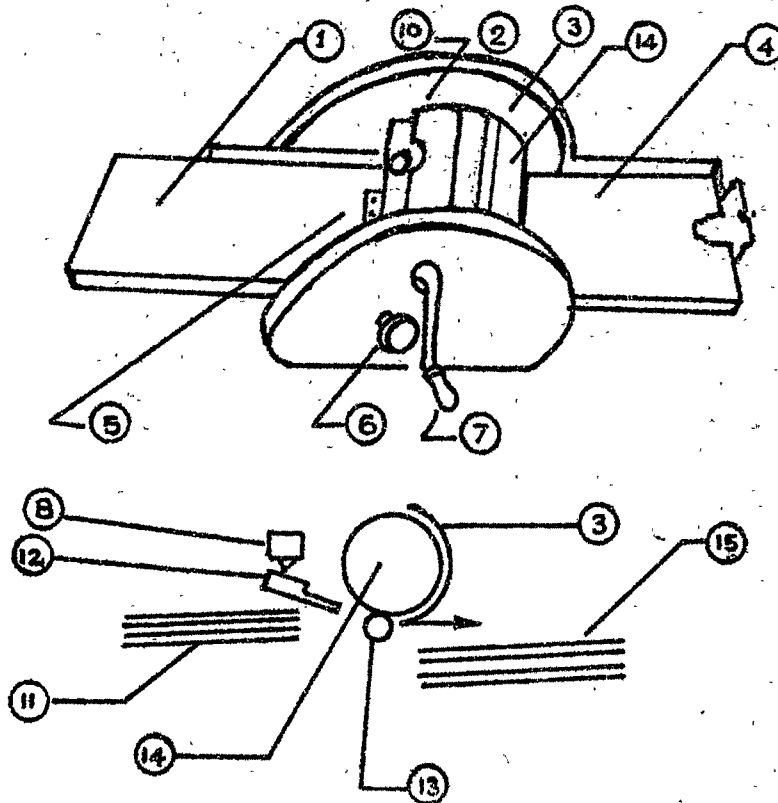
#### IV. LEAVE MACHINE:

- \_\_\_\_\_ remove and store spirit
- \_\_\_\_\_ set copy control knob and pressure control knob to zero.
- \_\_\_\_\_ replace dust cover

- \_\_\_\_\_ rotate clock wise again, close clamp leaver, leave drum to normal position.
- \_\_\_\_\_ remove and store unsued paper
- \_\_\_\_\_ stop handle to 7 '0' clock position
- \_\_\_\_\_ rotate counter clockwise, open clamp
- \_\_\_\_\_ file master after stapling to it a specimen
- \_\_\_\_\_ remove master without touching the carbon impression
- \_\_\_\_\_ clean the machine.

M IV/2-3/CT

9. Identify the parts of your spirit duplicator shown below and place appropriate number against the parts listed.



- |                              |  |
|------------------------------|--|
| ___ handle                   | ___ impression roller pressure knob.   |
| ___ strip for holding master | ___ feeding tray                       |
| ___ counter                  | ___ drum                               |
| ___ receiving tray           | ___ copying paper                      |
| ___ fluid tank               | ___ impression roller                  |
| ___ felt pad                 | ___ dripping nozzle                    |
| ___ master copy              | ___ pointer for top margin adjustment. |
| ___ duplicated copies        |  |

10. Prepare a master copy for the given text.
11. Operate the spirit duplicator and take 5 copies of the master you have made.

M IV/2-4/CT.

## Module IV

## Duplicating Processes

## Unit 2

## Spirit Duplication

1. The spirit duplicator is also known as
- ☐ a. Hexographic duplicator
  - ☒ \*\* b. Hectographic duplicator
  - ☐ c. Alcohol duplicator
  - ☐ d. Carbon duplicator
2. With spirit duplicator you can run 100 copies. This depends on the quality of three consumable materials. They are
- a. master
  - b. carbon
  - c. fluid
3. When the Master copy is mounted on the drum, the side facing up is
- ☒ \*\* a. the carbon reverse image side
  - ☐ b. the front side
  - ☐ c. the back side
  - ☐ d. positive side
4. For duplicating the copies, it is necessary to wet the
- ☐ a. carbon sheet
  - ☐ b. the master sheet
  - ☒ \* c. the copying paper
  - ☐ d. felt pad
5. The master copy is prepared by writing on
- ☐ a. front side of master sheet
  - ☐ b. back side of carbon sheet
  - ☐ c. on the master sheet
  - ☒ \* d. white side of the master sheet
6. The carbon sheet is placed in such a manner that the carbon side is facing.
- ☐ a. yellow side of master sheet
  - ☒ \*\* b. glazed side of master sheet
  - ☐ c. away from yellow side of master sheet
  - ☐ d. away from white side of master sheet

7. Write three safety precautions you would observe while using spirit duplicator.
1. SPIRIT IS HIGHLY INFLAMMABLE-HANDLE WITH CARE.
  2. DON'T SMOKE NEAR THE SPIRIT DUPLICATOR.
  3. DO NOT USE SPIRIT for cleaning hands it will react with skin.
  4. USE PROPER VENTILATION.
8. The procedure for operating a spirit duplicator is given below in a jumbled form under different headings. Number the operation in seriatum under each heading

I. READY THE DUPLICATOR:

- 5 Adjust pressure of impression roller
- 4 Adjust guides if any
- 7 Check for moistness of felt, wet if necessary
- 3 Place paper in the feed tray
- 8 Rotate and check for proper flow of fluid
- 2 Clean duplicator if required
- 6 Check for fluid in the tank, add if necessary
- 1 Remove the cover

II. ATTACH MASTER:

- 4 the side with carbon impression faces up
- 3 Insert the top edge of the master into the opening (about 5 mm)
- 1 turn handle to 7 'O' clock position.
- 6 return the clamping to normal locked position
- 2 rotate handle counter clock wise.
- 5 then rotate handle clock wise, and

III. RUN COPIES:

- 6 run copies, feed paper continuously, check continuously spirit, paper and other adjustments.
- 4 check again spirit flow and adjust if needed.
- 1 run test sheet
- 5 set counter for copy numbering
- 3 Adjust impression strength
- 2 Adjust margin (top and bottom)

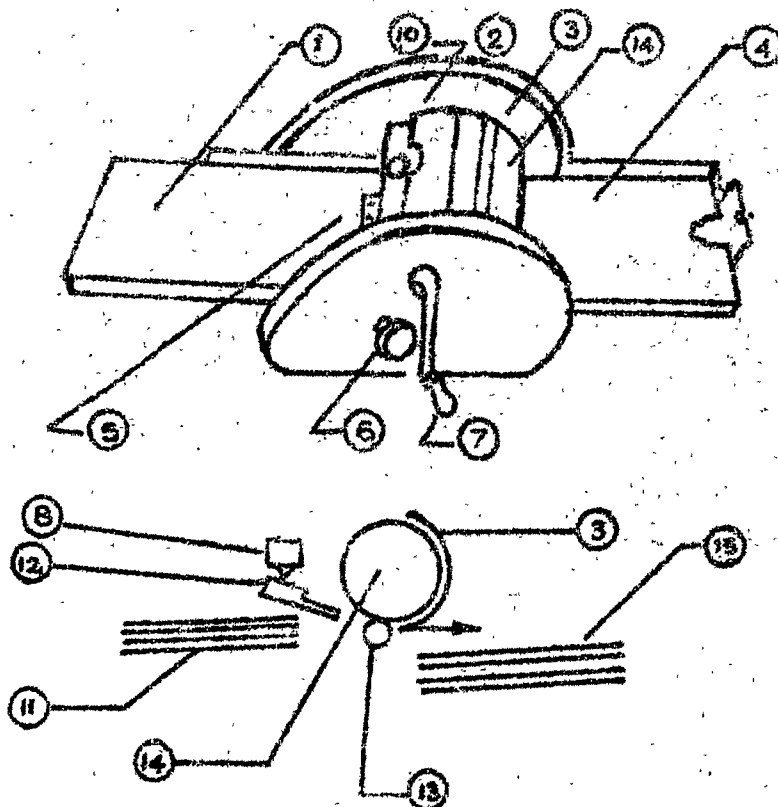
IV. LEAVE MACHINE:

- 7 remove and store spirit
- 6 set copy control knob and pressure control knob to zero.
- 10 replace dust cover
- 4 rotate clock wise again, close clamp lever.  
leave drum to normal position
- 8 remove and store unused paper.
- 1 stop handle to 7 'O' clock position
- 2 rotate counter clockwise, open clamp
- 5 file master after stapling to it a specimen
- 3 remove master without touching the carbon impression
- 9 clean the machine

M IV/2-3/KCT



9. Identify the parts of your spirit duplicator shown below and place appropriate number against the parts listed.



- |                                   |   |
|-----------------------------------|---|
| <u>7</u> handle                   | <u>6</u> impression roller pressure knob.   |
| <u>3</u> strip for holding master | <u>1</u> feed tray                          |
| <u>5</u> counter                  | <u>14</u> drum                              |
| <u>4</u> receiving tray           | <u>11</u> copying paper                     |
| <u>10</u> fluid tank              | <u>13</u> impression roller                 |
| <u>12</u> felt pad                | <u>8</u> dripping nozzle                    |
| <u>9</u> master copy              | <u>2</u> pointer for top margin adjustment. |
| <u>15</u> duplicated copies       |   |

10. Prepare a master copy for the given text.
11. Operate the spirit duplicator and take 5 copies of the master you have made.

M IV/2-4/KCT