



This specification applies to the method of soldering caps and base pins. Solder adheres to a metal by combining with it to make an alloy. Solder which is melted to a liquid form is heated to the required temperature to alloy with the surface of the metal, at which time the solder flows onto or wets the metal. To achieve this condition, the metal must attain or exceed the melting point of the solder. The solder and metal must be free of dirt and oxides and it is the function of soldering flux to maintain the clean surface. Certain metal surfaces as nickel plating, aluminum and chromium plating are difficult to solder because they are not readily wet by the tin-lead combinations. The alloy formed by the solder and metal has greater strength than the solder so that a thin solder joint is stronger than a thick one.

SCHEDULE NO. 3

1. EQUIPMENT

- a. For base pin soldering
 - 1. Automatic cutters as model 739H (soft glass only). Hand cutter such as Wise Co. No. 625 shears (hard glass only).
 - 2. Stainless steel or acid resistant container for holding fluxing pad and solutions.
 - 3. Felt pads such as made by Aetna Felt Co. Grade 2481S white stock.
 - (a) Round pads - 1-1/2" in diameter x 1/4" thick with 1/2" hole in center.
 - (b) Rectangular pads - 3" x 2" x 1/4" hard glass only.
 - 4. Gas fired soldering pots for base pins about 2-3/4" diameter x 7/8" depth. Complete assembly model #L785B-785P.

Note: To limit depth of pin insertion into solder pots, bases with lugs are provided with cylindrical stops in which lug fits. Pots for bases without lugs are provided with metal strip across top of soldering pot, in which a suitable hole has been drilled. Heating fires for pots must be enclosed on all sides by asbestos sheets.
 - 5. Suitable acid resistant container for holding a minimum of one pint of water used for removing liquid flux after soldering base pins. (Copper is considered suitable.)
 - 6. A sponge is placed in an acid resistant container (copper is considered suitable) for a quick contact of pins to remove excess water or when necessary a clean cloth may be used.
 - 7. The desirable table arrangement is set up with a transite top designed to hold the equipment flush with the table top to be used in the soldering operation.
 - 8. A permanent (or portable if necessary) thermocouple and meter assembly (chrome-alumel coupling) is used for controlling checks on the solder pot temperatures. The meter is to read directly in degrees centigrade.
- b. For cap soldering
 - 1. Motor driven brush using 10 sections wire brush L3011.
 - 2. Soldering iron for caps should be a copper rod 1/4" to 5/8" diameter cut off or filed at 45° angle to give a large contact surface which should be tinned with solder before use.
 - 3. Ideal equipment mounted on soldering and cleaning table model #772P.
 - 4. Porcelain or acid resistant flux container set in pan.

SCALE * General Revision

DIMENSIONS IN

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20-5412-1-60

PCL25956-126EW

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- 2. MATERIALS
 - F258A Liquid flux standard for tin, tin-lead and cadmium zinc solders for all contact cap soldering.
 - S132 Lead 77.5%, tin 20%, antimony 1.25%, silver 1.25% is presently used for pin solder for some soft glass types. (Color code blue)

S163M1 Lead 90%, tin 10% ingot - used for base pin solder for 813 and hard glass types with stranded leads.

S163W1 Lead 90%, tin 10% wire - used for cap solder on type 813 and hard glass types with stranded leads. (Color code red)

** S143 Lead 50%, tin 50% ingot - used for base pins except hard glass.

3. PROCEDURE

a. For base pin soldering

1. Preparation and use of flux pads and flux.

- a. Soak pad in F258A liquid flux.
- b. Use a suitable size acid resistant flux container. It is preferred that two felt pads be used so that the bottom pad (being immersed in flux) will distribute the flux evenly through the top pad. The top pad must be kept moistened during soldering. The top pad is to be discarded when dirty and a new pad placed on the bottom. This change depends upon the amount of tubes produced per hour. With approximately 250 tubes per hour the pad should be changed once every shift. However, if adverse conditions exist, such as a shortage of pads, one flux pad may be used if care is taken not to get too much flux on the pins. The flux pot must have 1/8" to 1/4" flux in the reservoir for soft glass. Any excess flux must be drawn off for hard glass. Add flux at intervals, as determined by experience, from a corked bottle with a glass spout.

Note: Flux is corrosive, consequently gloves, hands and working table must be free from flux. If any flux gets on flesh immediately wash off with water.

2. Cutting lead wires

*a. All wires must be cut to within 1/32" from ends of pins whether cut by hand or mechanical cutters. On inspection after soldering, ends must not protrude through solder in excess of 1/32".

3. Fluxing and soldering

- a. Apply flux *** to contact pins by touching pin ends evenly against pad. This brings ends of pins and a short length on side of pins in contact with flux. To avoid discoloration, an excessive amount of flux should not be applied. Immediately dip pins into solder at proper temperature, keeping pins in solder for length of time as specified in paragraphs 3a and 3b. ***

For tube type 813 only
first clean No. 5 lead by hand using No. 180 grit carborundum cloth. Then pre-tin using F258A flux with S163M1 solder. Finally immerse base pins 1/4" deep in the molten solder.

** Note: For photo tubes, pins shall be dipped into water 1/8" to 1/4" before fluxing.

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SUBJECT: SOLDERING CAPS AND BASE PINS
Process Specification

3. PROCEDURE (Cont'd)

- a. For base pin soldering (Cont'd)
- 3. Fluxing and soldering (Cont'd)

b. Solders and soldering conditions

	Solder	Optimum Temp. Range	Time (Sec.)	Flux	Depth of Dip
→	***				
	S132	345°C - 355°C	4	F258A	3-5mm
→	S163W1 & M1	* 355 - 365	* 4-5	F258A	3-5mm
→	***				
→	** S143	§350°C - 360°C	5-6	F258A	3-5mm

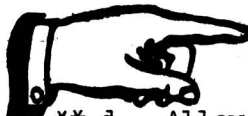
§ Range for base pin solder for color tubes 405 - 415°C
 (For proper type of solder refer to tube type parts list or general notice Std. Not. 3-1P-0 page 4a, Std. Not. 3-1K-0 page 4a, etc.)

- * Remarks - Maintain solder temperature within range specified, as lower temperatures slow operation unnecessarily and too much solder is used. Higher temperatures cause:
 - (1) Excessive amount of dross on surface of melted solder, which results in poor soldering.
 - (2) Solder to run out pins due to reduced surface tension. Only add one piece of solder at a time so as not to lower the temperature of the molten solder too much. Oxides must be removed more frequently from solders of low tin content than those of high tin content. Save dross for reclaiming.

- * c. Solder which extends onto the straight side of pins must not increase the respective pin diameters beyond the amounts shown:

for 0.125" pin by 0.006"	for 0.187" pin by .008"
for 0.156" pin by 0.006"	for 0.312" pin by .008"

 for shell octal, wafer octal, other bases with .093" pin by .005". Good soldering is indicated by flat or concave pin ends surface due to solder's capillary action of suck-in or draw-solder in pins on solidification. At least one-half of the pins in any one base should possess this flat appearance, indicating proper wetting of inside of pin. If solder is considerably concave from an excess, it is difficult to distinguish between holes and good soldering and is objectionable.



When using liquid flux, DO NOT REFLUX HOT PINS for resoldering IMMEDIATELY AFTER THE FIRST ATTEMPT AT SOLDERING.

- ** d. Allow pins to cool and then resolder. When pins are fluxed while hot, the liquid flux splashes on pins and base, and may cause electrical leakage. This is especially true of tubes that operate at high frequencies (power tubes) and at high voltages (cathode ray tubes). The more porous the base material the greater is the chance for electrical leakage.

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3. PROCEDURE (Cont'd)

a. For base pin soldering (Cont'd)

3. Fluxing and soldering (Cont'd)

- * e. After soldering, dip the pins to a depth of 1/4" (8-9mm for type 813) in clean deionized water. Deionized water is used to help limit oxidation of the pins. Quantity of wash water must not be less than 1 pint and must be renewed after every 4 hours of use or more often if necessary. The latter condition must be rigidly observed when basing power and cathode-ray tubes. A subsequent quick contact of pins with a sponge or rag should be made to remove excess water.

b. For contact cap soldering

1. Solid dumet leads

- a. In case of all solid conductor top leads, the lead should be cut with 2 or 3mm of the lead projecting above the top of the depression of the cap.
- b. Heat soldering iron to such a temperature that soldering wire will melt instantaneously.
- c. Run end of soldering wire across pad containing liquid flux and touch lead wire in center of contact cap which has previously been positioned directly under end of solder iron and about 3/16" away.
- d. In case of dumet leads press the cap and lead against the end of the soldering iron in such a way that the end of all top leads are bent down flat against the top cap depression.
- e. Press solder wire against solder iron until a sufficient amount of solder has been melted onto cap to give a strong contact. Do not allow to run down the sides of cap. The exact amount will have to be determined from experience.
- f. In order to have solder cover entire cap, press soldered cap lightly against end of soldering iron and work solder over untouched surface by moving cap.
- g. Since the cap is not dipped into the flux or pressed against a flux soaked pad, the cap need not be washed after soldering as done when soldering base pins with a liquid flux, but must be wiped with a clean rag.
- h. Caps need not be well rounded for appearance sake.

2. Hard glass tube types with stranded leads.

- a. After cap has been cemented to the bulb, the top lead should be cut with 2 - 3mm of the lead projecting beyond the flat surface of the cap.
- b. The cap and protruding lead are then pressed against a motor-driven wire brush to clean the nickel oxide from the lead. During this cleaning operation, the tube is rotated against the spinning wire brush in such a way as to unwind the stranded lead from its normal state and spread the wire strands to lay them flat against the top cap indentation.
- c. F258A flux is then applied to the ends of the spread lead (avoiding the hole in the top cap) from a piece of S163W1 .080" diameter solder dipped in flux.
- d. The soldering iron is heated to such a temperature to melt the solder instantaneously. The lead is soldered to the top cap by pressing the iron against the lead, to bring its temperature up to the melting point of the solder.
- e. Then follow steps e, f, g and h as described for (3b1) (Solid dumet leads).

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SUBJECT: SOLDERING CAPS AND BASE PINS
Process Specification

4. QUALITY CRITERIA

a. Contact caps

The major criterion to be met is to have a good electrical contact and sufficient strength between cap and lead. Other criteria to be met are:

1. No loose or unsoldered wire or wires.
2. No wire is to extend beyond solder.
3. No holes adjacent to wire.
4. Less than 10% of strands may be broken in any stranded lead on the tube.

b. Base pins

1. Solder must be continuous with no holes.
2. Motion of contact pin not to exceed 1/32" at pin tip when moved with fingers, nor should pins rotate more than 30 degrees.
3. Lead wires may protrude through solder only if the protruded lead does not * extend beyond end of pin, or beyond end of solder more than 1/32".
4. Flat or concave soldering of pins is the desired condition. However, convex soldering is acceptable if the height of the solder above end of pin does not exceed 0.020".
5. Sharp edges or sharp points are acceptable as long as they meet the specifications for gauge diameter.
6. Solder must have no scale or incrustations (embedded dirt). Discoloration to be criticized.
7. Solder contact of pins with 0.156" or greater design center must have 1/16" depth of solder contact.
8. No loose or unsoldered wire or wires permitted.
9. Pins must pass pin alignment gauge as specified previously in this notice.

5. SOLDERING CONTROLS FOR BASE PINS AND CONTACT CAPS

a. The temperatures of each solder pot will be taken and recorded two times per shift, at the beginning of the shift and after four hours. The condition of the flux pot and water rinse will be noted and recorded.

b. Two times per shift, as above, the base pins and contact caps on ten tubes, distributed from each type being made, will be inspected for the following conditions:

- Pin diameter - "go" or "no-go" - limits shown under soldering
- Presence of holes
- Protruding wires
- Cold solder
- Cleanliness

c. 1. Occasional X-raying of base pins to determine height of the solder in the pins is suggested and has given satisfactory results. However, if the X-ray equipment is not available a longitudinal cross sectioning of the pins may be done on a water wheel to determine solder height in the pins. This also is satisfactory but destruction tests of this nature are not advisable unless tubes of unrecoverable scrap nature are used.

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5. SOLDERING CONTROLS FOR BASE PINS AND CONTACT CAPS (Cont'd)

c. 1. (Cont'd)

However, these tubes may only be taken when they are determined scrap at the solder position and at that specific time, so the initial soldering process can be referred to at the same time.

- 2. The desirable solder surface of the pin ends is flat or concave with a draw or suck-in appearance. At least 1/2 of the pins on any one base must possess this appearance. Convex or completely rounded solder on the pin ends is considered good only on the ends. This may be caused by cold solder which is below desirable optimum temperature.

d. Record of deviations

At end of each shift, the completed record of deviations must be turned in to Quality Control Section.

Limits:

- 1. Solder pot temperatures for base pins.

S132	350 ± 5°C
S163ML	* 355 - 365°
** S143	350 - 360°C

- 2. Solder depth in pot will be at the height that will cover *3-5mm of pin ends except for type 813 to cover 5 - 7mm.
- 3. Flux pot must have 1/8" to 1/4" of flux in reservoir.
- 4. Water must be clean and 3/8" to 1/2" deep.

Note: If there is any deviation from the above limits, the supervisor will be notified and asked to initial the out of limit reading and remedy the situation. An "out of limits" reading will be rechecked every half an hour until it meets the requirements for two successive checks.

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DIMENSIONS IN

End of Schedule No. 3

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This specification applies to the method of soldering base pins. Solder adheres to a metal by combining with it to make an alloy. Solder which is melted to a liquid form is heated to the required temperature to alloy with the surface of the metal, at which time the solder flows onto or wets the metal. To achieve this condition, the metal must attain or exceed the melting point of the solder. The solder and metal must be free of dirt and oxides and it is the function of soldering flux to maintain the clean surface. Certain metal surfaces as nickel plating, aluminum and chromium plating are difficult to solder because they are not readily wet by the tin-lead combinations. The alloy formed by the solder and metal has greater strength than the solder so that a thin solder joint is stronger than a thick one.

SCHEDULE NO. 4
(Initially for 21AXP22)

1. EQUIPMENT

- a. Base threading table - L-785-BH
- b. Base baking unit consisting of
 1. Basing heater L-785-AY
 2. Aluminum alignment jig L-785-AY
 3. Automatic timing unit L-785-AY
- c. Acid resistant flux container for pads and solution.
- d. Felt pads such as made by Aetna Felt Co. Grade 2481S white stock 2-1/2" in diameter x 1/4" thick with 1-1/8" hole in center.
- e. Electric or gas fired soldering pots for base pins about 2-3/4" diameter x 7/8" depth. Complete assembly model #L785B-785P.

Note: To limit depth of pin insertion into solder pots, bases with lugs are provided with cylindrical stops in which lug fits. Pots for bases without lugs are provided with metal strip across top of soldering pot, in which a suitable hole has been drilled. Heating fires for pots must be enclosed on all sides by asbestos sheets.

- f. Suitable acid resistant container for holding a minimum of one pint of water used for removing liquid flux after soldering base pins.
- g. A sponge is placed in an acid resistant container for a quick contact of pins to remove excess water or when necessary a clean cloth may be used.
- h. The desirable table arrangement is set up with a transite top designed to hold the equipment flush with the table top to be used in the soldering operation.
- i. A permanent (or portable if necessary) thermocouple and meter assembly (chrome-alumel coupling) is used for controlling checks on the solder pot temperatures. The meter is to read directly in degrees centigrade.

SCALE _____

DIMENSIONS IN

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13D26-R2



BASING AND SOLDERING

SUBJECT: Process Specification

2. MATERIALS F258A Liquid flux standard for tin, tin lead and cadmium zinc solders for all base pin soldering.
- S143 Lead 50%, tin 50% ingot - used for base pins except hard glass.

3. PROCEDURE

a. Base Threading

1. Insert base in threader
2. Straighten all leads.
3. Starting with Pin 1 thread base counter-clockwise;
 - Pin 1 "Filament Lead"
 - Pin 14 "Filament Lead"
 - Pin 13 "Cathode" } Blue Gun
 - Pin 12 "Grid #1" }
 - Pin 11 "Grid #2" }
4. To thread rest of base, go to pin 2 and thread base clockwise;
 - Pin 2 "Grid #1" } Green Gun
 - Pin 3 "Grid #2" }
 - Pin 4 "Cathode" }
 - Pin 5 "Cathode" } Red Gun
 - Pin 6 "Grid #1" }
 - Pin 7 "Grid #2" }
 - Pin 9 "Grid #3" }
5. After the above operation is complete, being careful not to bend any of the wires push the base forward against the seal. To hold the base in place, fold the wires over against the center lug.

b. Base cement Baking

1. Remove the tube from the tube holder and place it on the baking table face down.
2. Remove the heating unit from its holder and place it on the base of the tube. "Do not force heater on tube".
3. Turn on heating unit by first turning timer switch OFF and then turning the switch ON.
4. After the timer turns the unit off, which will be indicated by the timer light going out, remove the heating units.
5. Clip all protruding wires from end of pins.
6. Bake out temperature should be $160^{\circ}\text{C} \pm 10^{\circ}$.
7. Any cracks or blisters on bases will cause rejection and tube shall be rebased.

c. For base pin soldering

1. Cutting lead wires
 - a. All wires must be cut to within $1/32$ " from ends of pins whether cut by hand or mechanical cutters. On inspection after soldering, ends must not protrude through solder in excess of $1/32$ ".

SCALE _____

DIMENSIONS IN

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SUBJECT: BASING AND SOLDERING
Process Specification

SUPERSEDES

MAY 1955

3. PROCEDURE (Cont'd)

c. For base pin soldering (Cont'd)

2. Preparation and use of flux pads and flux.

- a. Soak pad in F258A liquid flux.
- b. Use a suitable size acid resistant flux container. It is preferred that two felt pads be used so that the bottom pad (being immersed in flux) will distribute the flux evenly through the top pad. The top must be kept moistened during soldering. The top pad is to be discarded when dirty and a new pad placed on the bottom. This change depends upon the amount of tubes produced per hour. With approximately 250 tubes per hour the pad should be changed once every shift. However, if adverse conditions exist, such as a shortage of pads, one flux pad may be used if care is taken not to get too much flux on the pins. The flux pot must have 1/8" to 1/4" flux in the reservoir for soft glass. Any excess flux must be drawn off for hard glass. Add flux at intervals, as determined by experience, from a corked bottle with a glass spout.

Note: Flux is corrosive, consequently gloves, hands and working table must be free from flux. If any flux gets on flesh immediately wash off with water.

3. Fluxing and soldering

- a. Apply flux to contact pins by touching pin ends evenly against pad. This brings ends of pins and a short length on side of pins in contact with flux. To avoid discoloration, an excessive amount of flux should not be applied. Immediately dip pins into solder at proper temperature, keeping pins in solder for length of time as specified in paragraphs 3a and 3b.

b. Solders and soldering conditions

Solder	Optimum Temp. Range	Time (Sec.)	Flux	Depth of Dip
Sl43	360°C±10°	4-6	F258A	3-5mm

(For proper type of solder refer to tube type parts list or general notice Std. Not. 3-1P-0, Page 4a, Std. Not. 3-1K-0, Page 4a, etc.)

Remarks - Maintain solder temperature within range specified, as lower temperatures slow operation unnecessarily and too much solder is used. Higher temperatures cause:

- (1) Excessive amount of dross on surface of melted solder, which results in poor soldering.
- (2) Solder to run out pins due to reduced surface tension. Only add one piece of solder at a time so as not to lower the temperature of the molten solder too much. Oxides must be removed more frequently from solders of low tin content than those of high tin content. Save dross for reclaiming.

SCALE

DIMENSIONS IN

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BASING AND SOLDERING

SUBJECT: Process Specification

3. PROCEDURE (Cont'd)

- c. For base pin soldering (Cont'd)
3. Fluxing and soldering (Cont'd)

c. Solder which extends onto the straight side of pins must not increase the respective pin diameters beyond the amounts shown:

for 0.125" pin by 0.006"	for 0.187" pin by .008"
for 0.156" pin by 0.006"	for 0.312" pin by .008"

for shell octal, wafer octal, other bases with .093" pin by .005".
Good soldering is indicated by flat or concave pin ends surface due to solder's capillary action of suck-in or draw-solder in pins on solidification. At least one-half of the pins in any one base should possess this flat appearance, indicating proper wetting of inside of pin. If solder is considerably concave from an excess, it is difficult to distinguish between holes and good soldering and is objectionable.



When using liquid flux, DO NOT REFLUX HOT PINS for resoldering IMMEDIATELY AFTER THE FIRST ATTEMPT AT SOLDERING.

- d. Allow pins to cool and then resolder. When pins are fluxed while hot, the liquid flux splashes on pins and base, and may cause electrical leakage. This is especially true of tubes that operate at high frequencies (power tubes) and at high voltages (cathode ray tubes). The more porous the base material the greater is the chance for electrical leakage.

4. QUALITY CRITERIA

a. Base pins

1. Solder must be continuous with no holes.
2. Motion of contact pin not to exceed 1/32" at pin tip when moved with fingers, nor should pins rotate more than 30 degrees.
3. Lead wires may protrude through solder only if the protruded lead does not extend beyond end of pin, or beyond end of solder more than 1/32".
4. Flat or concave soldering of pins is the desired condition. However, convex soldering is acceptable if the height of the solder above end of pin does not exceed 0.020".
5. Sharp edges or sharp points are acceptable as long as they meet the specifications for gauge diameter.
6. Solder must have no scale or incrustations (embedded dirt). Discoloration to be criticized.
7. Solder contact of pins with 0.156" or greater design center must have 1/16" depth of solder contact.
8. No loose or unsoldered wire or wires permitted.
9. Pins must pass pin alignment gauge as specified previously in this notice.

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DIMENSIONS IN

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5. SOLDERING CONTROLS FOR BASE PINS.

- a. Two times per shift, as above, the base pins on ten tubes, will be inspected for the following conditions:
 - Pin diameter - "go" or "no-go" - limits shown under soldering
 - Presence of holes
 - Protruding wires
 - Cold solder
 - Cleanliness
- b. 1. Occasional X-raying of base pins to determine height of the solder in the pins is suggested and has given satisfactory results. However, if the X-ray equipment is not available a longitudinal cross sectioning of the pins may be done on a water wheel to determine solder height in the pins. This also is satisfactory but destruction tests of this nature are not advisable unless tubes of unrecoverable scrap nature are used. However, these tubes may only be taken when they are determined scrap at the solder position and at that specific time, so the initial soldering process can be referred to at the same time.
- 2. The desirable solder surface of the pin ends is flat or concave with a draw or suck-in appearance. At least 1/2 of the pins on any one base must possess this appearance. Convex or completely rounded solder on the pin ends is considered good only on the ends. This may be caused by cold solder which is below desirable optimum temperature.
- 3. A solder check by either of the preceding methods or by splitting open at least 3 pins per base shall be done at least once a week.
- c. Limits:
 - 1. Solder pot temperatures for base pins.
 - S143 360°C±10°
 - 2. Solder depth in pot will be at the height that will cover 3-5mm of pin ends.
 - 3. Flux pot must have 1/8" to 1/4" of flux in reservoir.

Note: If there is any deviation from the above limits, the supervisor will be notified and asked to initial the out of limit reading and remedy the situation. An "out of limits" reading will be rechecked every half an hour until it meets the requirements for two successive checks.

SCALE _____
DIMENSIONS IN

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BASING AND SOLDERING
SUBJECT: Process Specification

SUPERSEDES

This specification applies to the method of soldering base pins. Solder adheres to a metal by combining with it to make an alloy. Solder which is melted to a liquid form is heated to the required temperature to alloy with the surface of the metal, at which time the solder flows onto or wets the metal. To achieve this condition, the metal must attain or exceed the melting point of the solder. The solder and metal must be free of dirt and oxides and it is the function of soldering flux to maintain the clean surface. Certain metal surfaces as nickel plating, aluminum and chromium plating are difficult to solder because they are not readily wet by the tin-lead combinations. The alloy formed by the solder and metal has greater strength than the solder so that a thin solder joint is stronger than a thick one.

SCHEDULE NO. 5
(Initially for C73685P)

1. EQUIPMENT
 - a. Base threading table - L-785-BH
 - b. Base baking unit consisting of
 1. Basing heater L-785-AY
 2. Aluminum alignment jig L-785-AY
 3. Automatic timing unit L-785-AY
 - c. Acid resistant flux container for pads and solution.
 - d. Felt pads such as made by Aetna Felt Co. Grade 2481S white stock 2-1/2" in diameter x 1/4" thick with 1-1/8" hole in center.
 - e. Electric or gas fired soldering pots for base pins about 2-3/4" diameter x 7/8" depth. Complete assembly model #L785B-785P.
 Note: To limit depth of pin insertion into solder pots, bases with lugs are provided with cylindrical stops in which lug fits. Pots for bases without lugs are provided with metal strip across top of soldering pot, in which a suitable hole has been drilled. Heating fires for pots must be enclosed on all sides by asbestos sheets.
 - f. Suitable acid resistant container for holding a minimum of one pint of water used for removing liquid flux after soldering base pins.
 - g. A sponge is placed in an acid resistant container for a quick contact of pins to remove excess water or when necessary a clean cloth may be used.
 - h. The desirable table arrangement is set up with a transite top designed to hold the equipment flush with the table top to be used in the soldering operation.
 - i. A permanent (or portable if necessary) thermocouple and meter assembly (chrome-alumel coupling) is used for controlling checks on the solder pot temperatures. The meter is to read directly in degrees centigrade.
 - j. 1/4" artists brush.

SCALE _____
DIMENSIONS IN _____ UNLESS OTHERWISE SHOWN. DIMENSIONS SHOWN WITHOUT TOLERANCES ARE DESIGN CENTERS

4-554-7-65 LF-126JD

• CHANGE
•• ADDITION
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SUBJECT:

- 2. MATERIALS
 - F258A Liquid flux standard for tin, tin lead and cadmium zinc solders for all base pin soldering.
 - S143 Lead 50%, tin 50% ingot - used for base pins except hard glass.
 - A282A Basing Adhesive

3. PROCEDURE

a. Base Threading

1. Insert base in threader.
2. Straighten all leads.
3. Starting with Pin 1 thread base counter-clockwise;
 - Pin 1 "Filament Lead"
 - Pin 14 "Filament Lead"
 - Pin 13 "Cathode"
 - Pin 12 "Grid No. 1" } Blue Gun
 - Pin 11 "Grid No. 2" }
4. To thread rest of base, go to pin 2 and thread base clockwise;
 - Pin 2 "Grid No. 1" }
 - Pin 3 "Grid No. 2" } Green Gun
 - Pin 4 "Cathode" }
 - Pin 5 "Cathode" }
 - Pin 6 "Grid No. 1" } Red Gun
 - Pin 7 "Grid No. 2" }
 - Pin 9 "Grid No. 3" }
5. Dip artists brush in basing adhesive (A282A) and coat evenly 1/2" wide strip extending from the stem-neck seal.

** CAUTION: Do not get resin on the lead wires as poor soldering will result.

6. After the above operation is complete, being carefull not to bend any of the wires push the base forward against the seal. To hold the base in place, fold the wires over against the center lug.

b. Base cement baking

1. Remove the tube from the tube holder and place it on the baking table face down.
2. Remove the heating unit from its holder and place it on the base of the tube. "Do not force heater on tube."
3. Turn on heating unit by first turning timer switch OFF and then turning switch ON.
4. After the timer turns the unit off, which will be indicated by the timer light going out, remove the heating units.
5. Clip all protruding wires from end of pins.
6. Bake out temperature should be 160°±10°C.
7. Any cracks or blisters on bases will cause rejection and tube shall be rebased.

c. For base pin soldering.

1. Cutting lead wires.
 - a. All wires must be cut to within 1/32" from end of pins whether cut by hand or mechanical cutters. On inspection after soldering, ends must not protrude through solder in excess of 1/32".

SCALE

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3. PROCEDURE (Cont'd)

c. For base pin soldering (Cont'd)

2. Preparation and use of flux pads and flux.

a. Soak pad in F258A liquid flux.

b. Use a suitable size acid resistant flux container. It is preferred that two felt pads be used so that the bottom pad (being immersed in flux) will distribute the flux evenly through the top pad. The top must be kept moistened during soldering. The top pad is to be discarded when dirty and a new pad placed on the bottom. This change depends upon the amount of tubes produced per hour. With approximately 250 tubes per hour the pad should be changed once every shift. However, if adverse conditions exist, such as a shortage of pads, one flux pad may be used if care is taken not to get too much flux on the pins. The flux pot must have 1/8" to 1/4" flux in the reservoir for soft glass. Any excess flux must be drawn off for hard glass. Add flux at intervals, as determined by experience, from a corked bottle with a glass spout.

Note: Flux is corrosive, consequently gloves, hands and working table must be free from flux. If any flux gets on flesh immediately wash off with water.

3. Fluxing and soldering

a. Apply flux to contact pins by touching pin ends evenly against pad. This brings ends of pins and a short length on side of pins in contact with flux. To avoid discoloration, an excessive amount of flux should not be applied. Immediately dip pins into solder at proper temperature, keeping pins in solder for length of time as specified in paragraphs 3a and 3b.

b. Solders and soldering conditions

Solder	Optimum Temp. Range	Time (Sec.)	Flux	Depth of Dip
Sl43	360°C±10°	4-6	F258A	3-5mm

(For proper type of solder refer to tube type parts list or general notice Std. Not. 3-1P-0, Page 4a, Std. Not. 3-1K-0, Page 4a, etc.)

Remarks - Maintain solder temperature within range specified, as lower temperatures slow operation unnecessarily and too much solder is used. Higher temperatures cause:

- (1) Excessive amount of dross on surface of melted solder, which results in poor soldering.
- (2) Solder to run out pins due to reduced surface tension. Only add one piece of solder at a time so as not to lower the temperature of the molten solder too much. Oxides must be removed more frequently from solders of low tin content than those of high tin content. Save dross for reclaiming.

SCALE

DIMENSIONS IN

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BASING AND SOLDERING
SUBJECT: Process Specification

3. PROCEDURE (Cont'd)

c. For base pin soldering (Cont'd)

3. Fluxing and soldering (Cont'd)

c. Solder which extends onto the straight side of pins must not increase the respective pin diameters beyond the amounts shown:
for 0.125" pin by 0.006" for 0.187" pin by .008"
for 0.156" pin by 0.006" for 0.312" pin by .008"
for shell octal, wafer octal, other bases with .093" pin by .005".
Good soldering is indicated by flat or concave pin ends surface due to solder's capillary action of suck-in or draw-solder in pins on solidification. At least one-half of the pins in any one base should possess this flat appearance, indicating proper wetting of inside of pin. If solder is considerably concave from an excess, it is difficult to distinguish between holes and good soldering and is objectionable.



When using liquid flux, DO NOT REFLUX HOT PINS for resoldering IMMEDIATELY AFTER THE FIRST ATTEMPT AT SOLDERING.

d. Allow pins to cool and then resolder. When pins are fluxed while hot, the liquid flux splashes on pins and base, and may cause electrical leakage. This is especially true of tubes that operate at high frequencies (power tubes) and at high voltages (cathode ray tubes). The more porous the base material the greater is the chance for electrical leakage.

4. QUALITY CRITERIA

a. Base pins

1. Solder must be continuous with no holes.
2. Motion of contact pin not to exceed 1/32" at pin tip when moved with fingers, nor should pins rotate more than 30 degrees.
3. Lead wires may protrude through solder only if the protruded lead does not extend beyond end of pin, or beyond end of solder more than 1/32".
4. Flat or concave soldering of pins is the desired condition. However, convex soldering is acceptable if the height of the solder above end of pin does not exceed 0.020".
5. Sharp edges or sharp points are acceptable as long as they meet the specifications for gauge diameter.
6. Solder must have no scale or incrustations (embedded dirt). Discoloration to be criticized.
7. Solder contact of pins with 0.156" or greater design center must have 1/16" depth of solder contact.
8. No loose or unsoldered wire or wires permitted.
9. Pins must pass pin alignment gauge as specified previously in this notice.

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TUBE DIVISION
STANDARDIZING LANCASTER, PA.

2t-X4

STANDARDIZING NOTICE 34-24-60A

MAY 1955

BASING AND SOLDERING
SUBJECT: Process Specification

SUPERSEDES

5. SOLDERING CONTROLS FOR BASE PINS.

- a. Two times per shift, as above, the base pins on ten tubes, will be inspected for the following conditions:
 - Pin diameter - "go" or "no-go" - limits shown under soldering
 - Presence of holes
 - Protruding wires
 - Cold solder
 - Cleanliness
- b. 1. Occasional X-raying of base pins to determine height of the solder in the pins is suggested and has given satisfactory results. However, if the X-ray equipment is not available a longitudinal cross sectioning of the pins may be done on a water wheel to determine solder height in the pins. This also is satisfactory but destruction tests of this nature are not advisable unless tubes of unrecoverable scrap nature are used. However, these tubes may only be taken when they are determined scrap at the solder position and at that specific time, so the initial soldering process can be referred to at the same time.
- 2. The desirable solder surface of the pin ends is flat or concave with a draw or suck-in appearance. At least 1/2 of the pins on any one base must possess this appearance. Convex or completely rounded solder on the pin ends is considered good only on the ends. This may be caused by cold solder which is below desirable optimum temperature.
- 3. A solder check by either of the preceding methods or by splitting open at least 3 pins per base shall be done at least once a week.
- c. Limits:
 - 1. Solder pot temperatures for base pins.
5L43 360°C±10°
 - 2. Solder depth in pot will be at the height that will cover 3-5mm of pin ends.
 - 3. Flux pot must have 1/8" to 1/4" of flux in reservoir.

Note: If there is any deviation from the above limits, the supervisor will be notified and asked to initial the out of limit reading and remedy the situation. An "out of limits" reading will be rechecked every half an hour until it meets the requirements for two successive checks.

SCALE _____
DIMENSIONS IN

End of Schedule No. 5

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