

## PART XIV: SALADS, RELISHES, AND SALAD DRESSINGS

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## PART XIV: SALADS, RELISHES, AND SALAD DRESSINGS

### 1401—INTRODUCTION

Salads are the most versatile of all prepared dishes served in the Navy general mess. Salads can be combined into an interesting and good-to-eat part of every meal except breakfast. The salad knows no season. Menu writers can use salads lavishly any time of the year, from multiple-type arrays on salad bars to the salads served on individual salad plates. Spud coxswains, the salad chefs, can prepare simple green salad mixtures requiring a limited amount of work or those which are genuinely a work of art.

Salads serve a useful function on the menu. They are colorful and eye appealing, add pleasant texture and flavor contrasts to the rest of the meal, and constitute one of the chief sources of vitamin-rich foods in the diet.

Well-made salads are an inspiration to make. A number of important production principles are involved. The mere act of placing a food upon a lettuce leaf does not make a salad.

Salad dressings can make or mar a salad. They add distinctive interest and flavor, but must be chosen, prepared, and applied with extreme care.

Relishes are a special group of foods, served as an accompaniment to meat entrees, differing from salads mainly in the way they are served and in the quantity which constitutes a serving. About 2 to 4 tbsp are normally used as a portion size for chopped relishes which are usually a sweet-sour flavor combination.

On the other hand, cut strips of vegetables, also considered relishes, can be served as salads even though not used in combination with salad dressing. Pickled vegetables and olives, or similar foods, are also considered as relishes.

### 1402—CLASSIFICATION OF SALADS

Salad recipes in the Navy-Marine Corps Recipe Service fall into six general categories. In addition, some salads have properties which separate them into distinctive groups.

**1402-a—CLASSIFICATION ACCORDING TO MAJOR INGREDIENTS**—Salads may be grouped according to their major ingredients as follows:

#### Fruit

- Apple, raisin
- Apple, spiced
- Banana
- Fruit (mixed with marshmallows)
- Grapefruit-apple
- Grapefruit-orange

#### Fruit-vegetable combination

- Apple and carrot
- Banana fruit slaw
- Fruit slaw
- Carrot, celery, and raisin
- Carrot raisin
- Golden glow mold
- Grapefruit, celery
- Grapefruit, tomato
- Perfection mold
- Pineapple cole slaw
- Waldorf

**Cheese—Fruit or vegetable**

Stuffed celery cheese  
Cottage cheese  
Pears, pickle, and cheese  
Pineapple cheese

**Fish and Seafood**

Salmon  
Shrimp and celery  
Stuffed tomato with tuna  
Tuna

**Vegetable**

Asparagus  
Brown bean  
Cardinal vegetable  
Carrot  
Carrot, cabbage  
Carrot combination  
Chef's  
Cole slaw, plain  
Cole slaw, Mexican  
Cucumber, onion  
Green bean, hot  
Green bean, pickled  
Kidney bean and macaroni  
Lettuce  
Lettuce, old-fashioned  
Macaroni  
Potato, plain  
Potato, cold (with bacon)  
Potato, hot (with bacon)  
Spring  
Spring, mold  
Tossed vegetable  
Tomato aspic  
Tomato sliced  
Tomato stuffed  
Tomato vegetable aspic  
Thousand island mold  
Vegetable, cooked  
Vegetable, tossed

**Meat or poultry**

Corned beef vegetable  
Chicken  
Ham  
Ham and chicken  
Ham and egg  
Ham and swiss cheese  
Pineapple chicken  
Tomato stuffed with chicken

**Meat**

Veal

Although recipe directions are essential to a well-run and efficient mess operation, salads are one item on the menu where a little imagination and creativity on the part of the cook adds immeasurably to enhancing quality and attractive appearance of meals. Variation in salad dressings and garnishes can supply an endless variety of combinations which adds freshness to what might otherwise be a tired menu.

**1402-b—GENERAL CLASSIFICATION**—Other classifications of Navy-Marine Corps Recipes also are possible. Hot salads, for example, could be singled out as one category which requires separate preparation and service from the cold salads, as well as different menu use. Hot salads include—

Hot green bean, old-fashioned lettuce, hot potato, hot cole slaw with bacon dressing.

Another category of salads which are prepared and served differently is the molded type which has gelatin as an ingredient. Included in this group are—

Golden glow, molded spring, perfection, Thousand Island mold, tomato aspic (plain), vegetable tomato aspic.

A number of terms are used to distinguish salads. "Toss" salad and "Combination" may be used synonymously, or these terms may describe separate salads since both are methods of combining salad materials. "Chef's" salad is a vegetable combination which is prepared according to the chef's own particular recipe. This salad usually contains thin slivers of cooked meat.

"Slaw" is another term used to describe salads containing cabbage. Slaw is a Dutch word for cabbage. "Cole" is a term which refers to any plant in the mustard family, but the term generally is identified with cabbage.

## 1403—COMPOSITION AND NUTRITIVE VALUE

Salads offer almost unlimited ways of adding mineral and vitamin-rich vegetables and fruits and protein-rich meat, cheese, fish, and poultry to the diet. The amount of calories in salads vary according to the ingredients and dressing used. A simple salad composed of a half of peach, cottage cheese, and lettuce leaf and no dressing will have about 150 calories. On the other hand, one-half avocado with mayonnaise dressing and lettuce will contain as many as 350 calories.

Salads also contribute bulk to the diet. Fruits and salad vegetables contain considerable quantities of water.

Fruits and vegetables which retain freshness have better retention of vitamins. Ascorbic acid, or vitamin C, the major nutrient in these foods, is more subject to loss than any other vitamin or mineral, but can be conserved by proper refrigeration under humid conditions and by avoiding long exposure to air. When the food has been chopped, minerals also are leached out by long soaking periods in water.

Trimming of fresh fruits and vegetables is, of course, necessary to remove damaged leaves or inedible material, but should be held to a minimum. Generally, outer green dark leaves contain more nutrients than inner leaves.

## 1404—SALAD INGREDIENTS AND ADVANCE PREPARATION TECHNIQUES

The list of saladmaking ingredients is a long one, but perhaps the most important group of products used is greens. There are about 20 products on the commercial market considered as salad greens in addition to the number of lettuce varieties. The market forms and prep-

aration procedure for greens and other salad materials procured for the military services are discussed.

**1404-a—SALAD GREENS**—An attractive salad begins with clean, cold, crisp salad greens. Fresh, young greens should be used. Greens wilt from day to day even when kept under refrigeration. All greens used for salads are fragile, and must be properly cared for at all stages of preparation.

Subsistence personnel should become acquainted with all salad greens procured so that they may be combined for varied color contrasts and taste appeal. (See illustration 1, p. D14-4.)

**1404-a(1)—Lettuce**—The lettuces are key members of the "greens" family. There are many varieties, each having its own characteristic flavor. The color varies from almost white or pale green to deep green.

The military services procure two major types of lettuce, including iceberg (also known as crisphead) and Boston (sometimes called butterhead).

**Iceberg**—This variety is by far the major type of lettuce used. It is readily available and is in good supply all year, but reaches a peak in May, June, and July.

Iceberg lettuce can be identified by its compact head with tightly packed leaves. The outer leaves are a dark-green color and can be used to make a base for an arranged salad plate, in sandwiches, or shredded for mixed salad greens. The inner leaves are medium to pale green and can be used to make the cup that holds the salad mixture for individual salads.

Iceberg lettuce is packaged individually in a polyethylene wrapper for export use. A

standard fiberboard container of lettuce weighs between 40-45 lbs. Wirebound crates average slightly more weight. Lettuce is sized by count or counts per container in terms of dozens or half dozens.

Boston—This type has tender, green, smooth leaves which are not as crisp as iceberg lettuce



Iceberg lettuce.



Romaine.



Boston lettuce.



Crisphead lettuce.

#### Illustration 1

Know Your Salad Ingredients, Be a Salad Expert

leaves. Boston lettuce has a loose head and the leaves separate easily. The inner leaves are especially tender and have a buttery feel and taste. Boston lettuce is available all year. Boston is packed in wirebound crates of 18-20 lbs.

Other Types—Leaf lettuce, not procured for the military service, is a type which does not form a head. It is the type most common to home gardens. Leaves are medium to dark green, are quite crinkly and about the same texture as Boston lettuce.

Stem lettuce, or celtuce, is one variety with an enlarged stem and no head. The leaves are not palatable except when very young.

Pre-Preparation Suggestions—Lettuce should not be trimmed until about 24 hours before ready to use. The packaged heads are compact and take much less chill space than when cored and trimmed.



Step 1—Cut out the core with a point of a knife, then hold cut opening under a stream of water.

The most effective way for washing single head lettuce is to cut out the core with the point of a knife, then hold the cut opening under a stream of water. This rinses and forces the outer leaves apart. If desired, these may be removed and set aside for use as cups. Drain thoroughly before refrigerating and using. (See illustration 2.)

If large quantities of lettuce are to be prepared, rinse the heads and let stand about 20 minutes, cavity down, after cutting out the core, instead of holding under running water.

Lettuce should be refrigerated again before serving to obtain maximum crispness. If adequately drained, properly covered, and the air is excluded, lettuce will not turn brown upon standing in refrigeration. If refrigeration space is available, separated leaves should be graded into convenient piles in covered containers so that coarser, outer leaves are in one container and the cupped, inner leaves in another. Invert piles to facilitate draining.



Step 2—Remove outer leaves and set aside for use as cups.

Illustration 2  
Preparation of Lettuce

**1404-a(2)—Endive and Escarole**—These are commonly used salad greens procured for the Armed Forces.

Chicory, a salad green of a similar family, is another name for curly endive. This type of endive is referred to as American endive.

American chicory, or curly endive, has narrow, curled, feathery leaves. The outer leaves are slightly bitter, but the inner leaves are of a sharp, tangy flavor which adds a pleasant contrast to other greens in a salad.

Escarole, much like American endive, has broader leaves but a less sharp flavor. The dark-green leaves are edged in yellow and are twisted and wavy, with heavy white midribs.

Directions for washing and preparing these greens are given in paragraph 1404-b, "General Pre-Preparation Suggestions for Handling Salad Greens."

**1404-a(3)—Romaine**—Another name for this salad green is Cos lettuce. It is recognized chiefly because of the elongated shaped head. It has long, straight, spoon-shaped, dark-green leaves with thick midribs. The leaves are crisp with a sharp, nutty flavor, but are less tender than lettuce, although they are of good eating quality.

See directions for washing and preparing these greens in paragraph 1404-b, "General Pre-Preparation Suggestions for Handling Salad Greens."

**1404-a(4)—Other Greens Used for Salads**—A wide variety of other greens are used for salads. Those procured for the military services include cabbage, tender green onion tops, parsley, celery leaves, and young, fresh spinach leaves.

The dark-green spinach leaves have a tangy flavor and provide a nice color contrast with other leaves in a green or combination salad.

Many forms of cabbage (green, white, or red) are used for salads. To prepare cabbage, cut heads in quarters and remove core. Soak cored quarters in salted water to remove any insects. Drain and rinse. Remove tough outer leaves and save for fine chopping or shredding. The quarters may be shredded as desired. To crisp washed, shredded, or chopped cabbage, place in tightly covered container and leave in refrigerator until thoroughly chilled.

Dehydrated cabbage to be used for salads preferably should stand in cold water in a covered container overnight in the refrigerator. Use 2 gal of water per pound of cabbage to reconstitute it. If time for an overnight soak period cannot be allowed, soak for less time, but let stand for at least 4 hours to insure crispness.

**1404-b—GENERAL PRE-PREPARATION SUGGESTIONS FOR HANDLING SALAD GREENS**—Greens are among the most perishable vegetables, but if properly handled should present no problem.

**1404-b(1)—Purchasing**—When greens are purchased by weight per container, weigh them in on arrival and proceed at once to inspect the delivery to determine if condition and grade quality are up to the contract standard. Remember that produce grading is done at the shipping point; make sure the items have been treated properly in transit.

No. 1 grade salad greens are procured for the military services. Greens of this grade will be fresh, not overmature, wilted, shriveled, or discolored.

Avoid overordering and plan to use greens as quickly as possible. One of the most common mishandling practices is failing to refrigerate them promptly after inspection. Best stor-

age temperature is 32° F with a preferred relative humidity of 90-95 percent. Under these storage conditions, fresh greens in good condition can be expected to last about 2 weeks. However, the storage life of closely trimmed heads of lettuce packaged individually in polyethylene bags and stored at 33° F can be extended beyond a 2- to 3-week period.

**1404-b(2)—Trimming and Washing**—Do not trim or wash greens, nor remove them from their shipping container unless they are needed within 24 hours. When greens are removed from the reefer for preparation, proceed to trim and wash as quickly as possible. Never allow greens to stand at room temperature for any length of time. Observe these steps in trimming and washing:

1. **SORT.** Discard damaged outer green leaves, remove and save tough and discolored parts of the leaves that can be used. Keep as many outer leaves as possible to make the salad more attractive and nutritious. If wilted, they can be crisped in ice water.

2. **SEPARATE LEAVES OF ROMAINE, ESCAROLE, AND ENDIVE.** Remove the stems and discard them. Lettuce heads should remain intact except for coring if to be used as wedges.

3. **FILL SINK  $\frac{3}{4}$  FULL OF LUKEWARM OR COOL WATER.** Warm water does a better job of washing salad greens than cold water but do not use water that is too warm. Add salt to water to help rid leaves of insects. If double sinks are available, fill the second sink  $\frac{3}{4}$  full with cold unsalted water.

4. **PLACE SEPARATED LEAVES IN FIRST RINSE WATER. SOAK FOR A SHORT PERIOD OF TIME.** Greens should have plenty of space, so wash a few at a time.

5. **USING HANDS OR A MESH BASKET, TRANSFER GREENS FROM FIRST TO SECOND SINK. WASH BY LIFTING GREENS UP AND DOWN IN WATER.**

6. **DRAIN LEAVES.** Water clinging on stems and leaves will help to crisp the leaves if stored covered in the refrigerator for a sufficient length

of time. Very young salad greens will crisp in about an hour; older greens may require several hours.

7. **NEVER CUT SALAD GREENS WITH A KNIFE.** Tear into convenient bite-size pieces.

**1404-c—SALAD VEGETABLES**—Many raw, fresh vegetables are highly perishable and will find limited use in saladmaking afloat. Celery has special packaging for export use to preserve maximum freshness. Carrots, turnips, and dry onions are vegetables which have long storage life.

Canned, cooked, dehydrated, fresh, and frozen vegetables are used. Two dehydrated salad vegetables that can be substituted for their fresh, raw counterparts are sliced onions and diced green peppers.

Preparation techniques and procurement tips for specific salad vegetables are discussed.

**1404-c(1)—Raw Salad Vegetables**—Several vegetables in this category are highly perishable. These include cucumbers, green onions, sweet peppers, radishes, and tomatoes. The less perishable vegetables, however, also require special handling for maximum crispness in salad preparation.

**Carrots**—Topped carrots kept at 32° F in a 90-95 percent relative humidity should remain in good condition 4 to 5 months. Young carrots have comparatively thin skin and will peel quickly, so use care not to destroy valuable nutrients next to the skin or waste this important root vegetable by peeling too deeply. Scrub thoroughly, trim off stem and root ends before peeling, and wash again before cutting for salads.

Raw carrots can be cut in a variety of ways. Varying the type of cut makes for texture contrast when combined with other vegetables or

fruits. Shredded, grated, ground, and diced carrot cuts are specified in the Navy-Marine Corps Recipe Service. Julienne carrot strips are a popular relish item. Thinly sliced carrots for curls can be used as salad garnishes. For making carrot curls, use a hand potato peeler for thin lengthwise strips. Curls and strips are more appetizing if dropped into ice water for a period of crisping prior to service. (See illustration 3.)

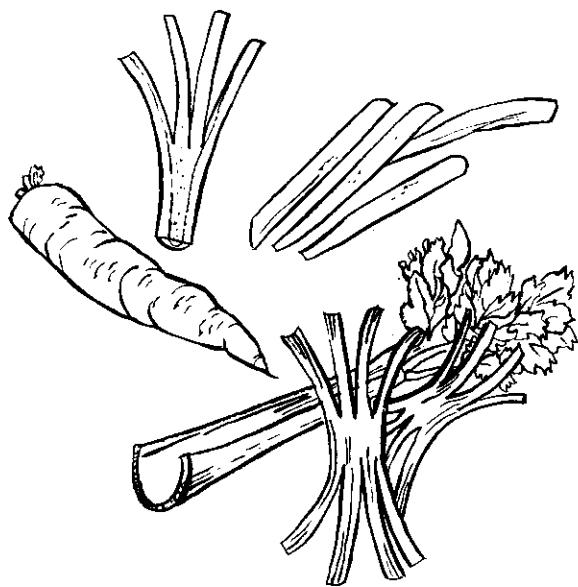


Illustration 3  
Carrot Fans and Sticks, Celery Curls

Cauliflower—Fresh cauliflower which has been soaked in salt water, rinsed, drained, and broken into tiny flowerets has pleasant flavor and crisp texture.

Celery—The green, or pascal, celery is procured for the military services. This type of celery has crisp, juicy stalks but heavy strings or midribs. No. 1 grade pascal celery should have straight stalks free from pithiness, and well-trimmed stalks with outer branches removed. Export celery is packaged by individual stalks in polyethylene wrappers before packing in crates. Celery is sized, and the number of stalks in the crate or shipping container range from a count of 24 to 48. This 2- to 4-doz-stalk shipping container is suitable for Navy use.

Cut off stem ends. Separate outer stalks from heart. Wash and trim bruised and blemished parts. A thorough scrubbing with a vegetable brush may be necessary to remove heavy dirt. Trim off the heavy strings or midribs with a hand potato peeler. To dice, cut lengthwise. Several stalks may be diced at one time by cutting strips crosswise with a knife on a cutting board. Celery hearts are good salad-bar items.

Celery curls, fans, or rings may be used for relishes. To make a curl or fan, cut celery into 2½-in. lengths. Make lengthwise cuts  $\frac{1}{8}$  in. apart and about 1 in. in length on one or both ends of celery strips. Place in ice water about 2 hours before serving to crisp and curl.

Cucumbers—No. 1 grade cucumbers procured for the military services must not be more than 2½" in diameter and not more than 6" in length. Cucumbers of this quality have a fresh appearance, are not shriveled nor withered. The color is dark green, and the skin has a shiny waxy appearance. (See illustration 4.)

Cucumbers are one of the more flavorful salad vegetables used to achieve crispness and "crunch" in salad mixtures. To prepare them, wash and pare, or score lengthwise with a fork.



Illustration 4  
Proper Method of Peeling Cucumbers

To insure maximum crispness, let cut slices stand in salted ice water 15 minutes. (See illustration 5.)

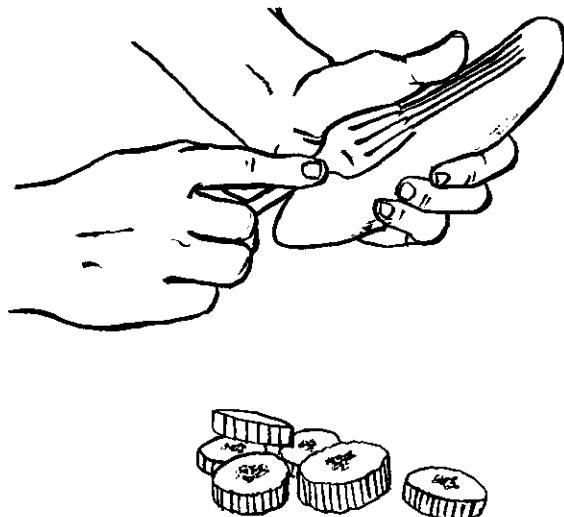


Illustration 5  
Fluting a Cucumber

Green Onions—No. 1 grade green onions are procured for the Navy general mess. Green onions are usually shipped on the basis of dozens of bunches per package. A 10-dozen-bunch crate weighs between 30-35 lb.

Fresh green onions have about 1 week's storage life at 32° F if kept in 90-95 percent relative humidity. Green onions are recommended for use in general messes ashore or for ships in port. Dry or dehydrated onions make successful substitutes for fresh onions in all salad recipes.

To prepare green onions, remove wilted leaves and defective parts, outer skin layer of the bulb, and firm root end under running water. Green onions may need an additional crisping period. If so, place in water to cover and refrigerate.

Peppers, Sweet—Fresh green peppers are another highly perishable salad vegetable. Whenever practicable, the dehydrated item should be used as a substitute ingredient when recipes specify cut or chopped green pepper.

Peppers procured for the military services are Fancy or No. 1 grade. These are bell or bull-nose types. Peppers in these grades are about 2½" in diameter, and clear bright green, with red spots appearing as the peppers become more mature. Redness should not be associated with hot-type peppers. Crispness and tenderness are indicative of good quality.

To prepare peppers for salads, wash and remove stems and seeds. Various types of cuts may be made depending on the particular use in salads. When combined with other vegetables, chop, dice, or cut into thin slices as directed on the recipe. Pepper rings or sticks are also popular relishes.

Radishes—No. 1 grade radishes procured for the military services are the round, red variety. These radishes are well formed, smooth, firm (not soft nor pithy), crisp, and mild in flavor. Radishes are sized small (less than ¾" in diameter) or medium (¾" to 1" in diameter). Large radishes are not used. Tops may be clipped or radishes may be packed with full-length tops.

Radishes add color, crispness, and flavor interests to salads. Do not peel; remove tops and stems and wash thoroughly. Use thin slices for mixed salads. Use trimmed, whole radishes as a relish.

Radish roses or accordians are colorful, edible garnishes for salads. To make a rose, cut off the tip end of the radish with a sharp knife. Leave an inch or two of the green on the stem end for added color. Make four or five petal-shaped slices around the radish from the cut end to the center. Place radishes in ice water. Petals will gradually open to form a rose. Accordions are made by removing stem end and tops. Cut radishes crosswise, but not quite through to the side resting on the cutting board. Make very thin slices, as many as possible per radish. Place in ice water to make slices fan out, accordion-style. (See illustration 6, p. D14-10.)

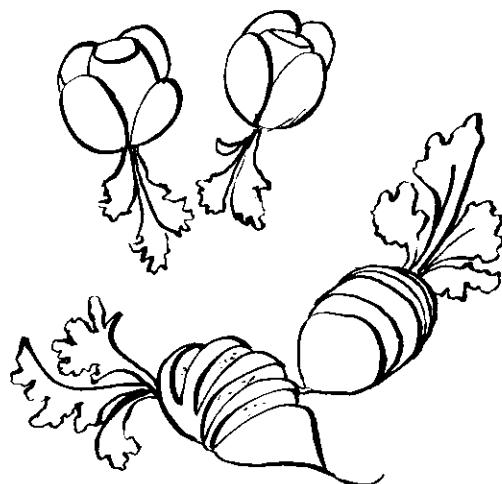


Illustration 6  
Radish Roses and Accordians

Tomatoes—The quality of tomatoes depends to a great extent upon the stage of ripeness when harvested. Vine-ripened tomatoes are of better quality but do not ship well because of softness and may spoil before reaching destination. Fresh tomatoes are picked, therefore, at this classification of ripeness and shipped:

Green—no red or yellow color.

Breakers—definite break in color from green to about 10 percent yellow, pink, or red.

Turning—definite change from red or yellow, covering from 10 to 30 percent of surface.

Pink—30 to 60 percent of the surface colored, pinkish red or red.

Red—more than 90 percent of the surface shows red color.

The size and stage of ripeness desired should be specified on requisitions so that usage can be properly planned according to the needs.

Tomatoes vary a great deal in size. Packing arrangements for shipping depend upon how large the tomatoes are in diameter. Minimum diameter is determined by measuring the tomato at right angles from stem to blossom end. Packing is done according to this measurement and depending upon packing location. Military procurements are made by Los Angeles lug size arrangements, that is 5 by 5, 5 by 6, 6 by 6,

and 6 by 7. A "straight pack" Los Angeles lug size arrangement has these sizes and counts:

Tomato Size (Diameter)	Tomatoes Per Layer	Total No. Tomatoes Per Lug
5 x 5 . . . . .	25	75
5 x 6 . . . . .	30	90
6 x 6 . . . . .	36	106
6 x 7 . . . . .	42	126

These counts will vary if "straight pack" is not specified. Packs may have a diagonal arrangement as "extra row packs," "bridge packs," or any combination of other type packs.

How to prepare tomatoes for salads depends on the stage of ripeness. Many prefer to peel tomatoes for salads because of the tough skins. If skins are difficult to remove, place tomatoes in a wire basket and dip quickly in hot water. The skins will begin to break and loosen. Then dip in cold water and slip off skins. Cut out stem end. Chill. Slice as desired or serve whole with centers scooped out or cut in wedges or cubes, depending upon type of the salad and size of portions. (See illustration 7.)



Illustration 7  
How to Slice a Tomato Safely

Turnips—These are seldom used as a salad ingredient, but their use is encouraged as a substitute for cucumbers and for the sake of variety. Cut off stem top, wash, pare by hand, shred, or cut into fine strips.

**1404-c(2) Cooked Salad Vegetables**—A number of salad recipes in the Navy-Marine Corps Recipe Service are made completely or partially of canned, cooked fresh, frozen, or dehydrated vegetables. These include—

asparagus (canned or frozen),  
beans, green (canned, cooked, frozen, or reconstituted cooked dehydrated),  
beets (canned),  
carrots (canned or cooked fresh),  
peas (cooked defhydrofrozen, canned, cooked frozen),  
pimientos (canned),  
potatoes (cooked fresh or rehydrated cooked dehydrated slices).

**1404-c(3) Fresh Fruits**—Fresh or raw fruits are used less frequently as salad ingredients in the Navy general mess than raw vegetables, but are extremely pleasant in menus from texture and flavor standpoints. Tips on procurement, handling, and preparing individual fruits are discussed.

Apples, Fresh—Information on variety, marketing season, and use is set forth in Table A, "Guide for Using Apples," part XIII, this section.

Apples vary widely in suitability for different uses. Apples for salad use should be crisp and juicy, moderately acid with some sweetness. Apples are sized by measurement in diameter. Those procured for the military services run by count 113 per Western box. Approximately three medium-sized apples of this size equal 1 lb.

Select apples with uniformly good color and free from skin blemishes for salad use. Wash and remove bruises, spots, blossoms, and stem ends. Core and quarter apples. Do not peel. Cut into  $\frac{1}{2}$ -in cubes for recipes in the Navy-Marine Corps Recipe Service. Or, if used as in-

dividual slices in fruit plates, apples may be cut in wedges.

Prevent discoloration of apple slices and cut cubes by dipping in lemon juice or other acid fruit juice. Drain before placing in salad. Discoloration also can be prevented by dipping in an antioxidant solution as described in this section, part XIII, paragraph 1302-b(4).

Avocados—This fruit combines very well with mixed salad greens. It is not included as a salad ingredient in the Navy-Marine Corps Recipe Service as it has limited use because of season and perishability.

Avocados are excellent sliced and served with grapefruit and/or orange sections and served with an appropriate salad dressing. Halves of avocados filled with chicken or shrimp salad are summertime favorites.

Avocados are best if properly ripened. Good-quality fruit should have flesh that is just beginning to be soft and buttery. Ripeness proceeds best if placed in a warm, humid place (70 to 80° F) for 1 to 5 days.

There are several important commercial varieties of avocados available to the military services which are graded according to the Florida avocado standard. Usually, Florida avocados are a heavy type, pear shaped or slightly round to oval shaped. Avocados are shipped in fiberboard or wireboard wooden boxes containing 30-35 lb each, with counts ranging from 16 to 30 avocados each. Or, avocados are packed in fiberboard flats containing from 13 to 17 lb with various counts of from 8 up to 20 avocados per flat.

Peel ripe avocados shortly before serving, starting at the stem and by inserting a small knife between the skin and flesh. Cut into halves or quarters and remove seed. Slice, dice, or cut into balls for use in fruit or vegetable salads. (See illustration 8, p. D14-12.)

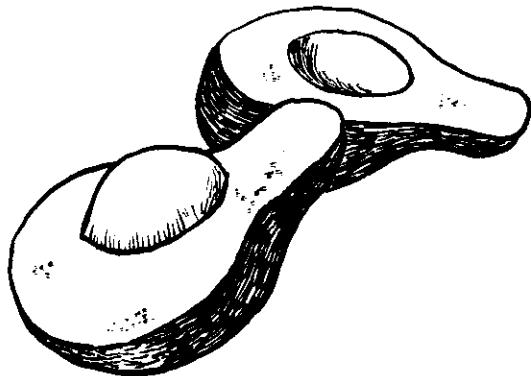


Illustration 8  
Avocado Halves

Avocados discolor rapidly. They should be dipped in lemon juice or dip in the antioxidant solution, as described in this section, part XIII, paragraph 1302-b(4), and drained before using.

Bananas—Bananas are procured fully ripe. "Full ripe" means no trace of green but full yellow color, well-flecked with specks. Full-ripe bananas can be held at 40° F for several days.

Hard-ripe bananas have bright banana color with no trace of brown, are acid in flavor, and require about 3 days of storage at room temperature to ripen. Bananas are sold cut from the stem or bunch in 40-lb cartons.

To give variety to fruit salad, vary the shape into which bananas are cut. Use slices; long, medium, or short pieces; or thirds and halves cut lengthwise. To flute bananas, run the prongs of a fork lengthwise down the peeled surface. This makes crinkly edged rounds when the banana is sliced.

Bananas turn dark very rapidly which precludes advance peeling and slicing. Dip each cut piece into pineapple or other acid fruit juice or dip in the antioxidant solution, as described in this section, part XIII, paragraph 1302b(4), and drain before serving.

Citrus Fruit—Sections of oranges and grapefruit are used in fruit salads. Select large, firm fruit to be used as sections in salads. Procurement tips for these fruit are in paragraph 1302-c(3).

To peel oranges and grapefruit: Bring a large kettle of water to the boiling point. Add about 3 doz grapefruit or oranges and allow to stand 3 to 5 minutes. Remove and cool immediately. Peel and chill.

To section, place on a cutting board. Cut a thin piece from top to bottom of peeled fruit. Remove sections by cutting along the membrane of a section, using a downward stroke toward the center of the fruit. Insert the knife blade along the next section and force it toward the center of the fruit. Repeat for each section. (See illustration 9, p. D14-13.)

Make certain that all membranes and the peel are removed. Because of the bitter flavor they may impart, it is best to remove these for maximum eating enjoyment of citrus fruits.

Melons—If desired, melon may be used as an ingredient in fruit salads. Pare, dice, or cut into uniform wedges or strips. To make melon balls from cantaloupe, watermelon, honeydew, and other melons use the teaspoon of a measuring set which when twirled will make a complete circle.

Peaches and Pears—Fresh peaches and pears are not listed as salad ingredients in the Navy-Marine Corps Recipe Service, but may be used by general messes ashore or by ships in port. Add sliced peaches or pears to fruit salads or to cottage cheese combinations.

Peaches have a more limited season than pears and are more perishable. Select and use only well-ripened peaches for salads. Peel by submerging in boiling water for a few minutes to aid removal of skins. After removing skins, immerse halves into antioxidant dip as described in part XIII, paragraph 1302-b(4). Peach halves

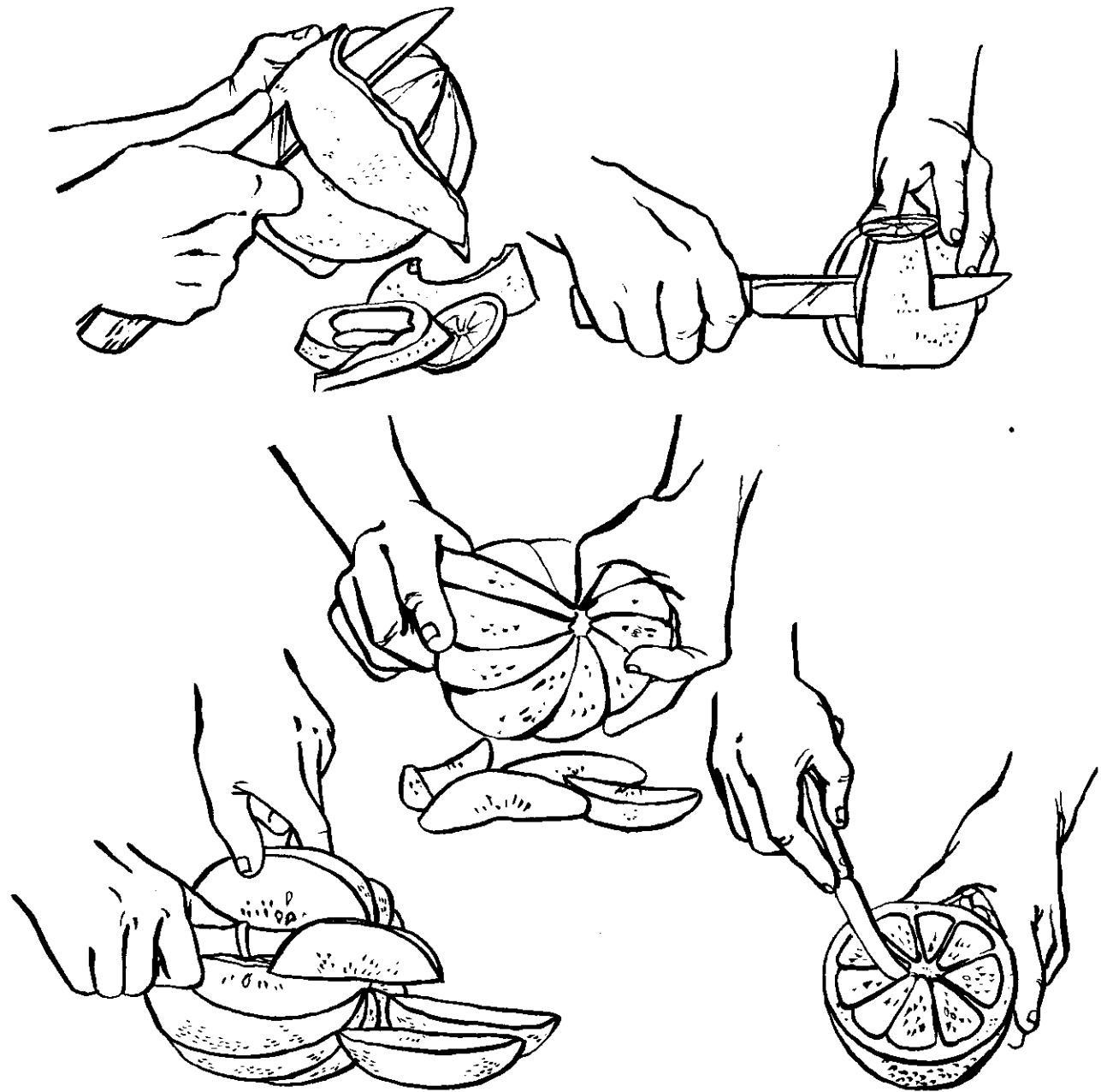


Illustration 9  
Ways of Serving Citrus Fruits; Peeling, Slicing and Sectioning

or slices may be dipped in an acid fruit juice (lemon or pineapple) to prevent discoloration. Chill thoroughly.

Pears should be ripe also. Keep them at room temperature a few days to soften. Pears may

be used unpeeled if skins are colorful and free from defects. Whether or not peeled, dip pears in acid fruit juice or antioxidant solution to prevent cut surfaces from turning dark upon exposure to air. Use pear halves, slices, or wedges in combination fruit salad or in cottage cheese pear salads.

Pineapple—Fresh pineapples have limited use in the Navy general mess. They are delicious additions for fresh fruit salads, but must be properly prepared for optimum enjoyment. Do not use fresh pineapple in gelatin salads unless pineapple has been cooked, or brought to a boil, in a simple syrup solution. Pineapple contains an enzyme, a chemical substance, which will destroy the gelatin's congealing action. Gelatin salads containing fresh pineapple will not "set up" or harden. Frozen pineapple and frozen pineapple juice are not procured for the military services.

To prepare fresh pineapple, cut off top and cut out eyes then cut in four sections lengthwise. Remove and discard hard center and cut into  $\frac{1}{4}$ -in pieces or cubes. Sprinkle with sugar and let stand in refrigerator a few hours before using.

**1404-c(4) Frozen Fruits**—Frozen fruits are used less frequently for salads than fresh or canned; but out-of-season fruits such as peaches and strawberries can add variety to salads.

To have frozen fruits at their best for salads, there should be a slight trace of ice crystals in the fruit when served. To prevent discoloration while defrosting, thaw fruit in closed package to exclude the air.

**1404-c(5) Canned Fruits**—A large assortment of canned fruits are appropriate for use in salads. The major point to remember in the use of canned fruit is to select fruit pieces that are not torn or mushy. Pieces, whether used whole or cut into slices or wedges, should have well-defined edges. Thorough draining is also necessary.

**1404-c(6) Dried or Dehydrated Fruit**—Dehydrated prunes and dried raisins and dates are fruits which are used as salad materials. The dehydrated prunes must be reconstituted, cooked, seasoned, and chilled before use. Dates require only cutting.

Raisins must be plumped to be a palatable salad ingredient. Place raisins in colander or strainer over hot water and cover. Let water under raisins boil for 5 minutes; remove and chill raisins before adding to salad.

**1404-c(7) Meat, Poultry, and Fish**—Cooked meats used for salads are cubed or cut into julienne strips. Chicken may be cubed, diced, or left in bite-size chunks. Canned salmon or tuna should be drained, skin and bones removed, and the fish flaked before incorporating in salad.

## **1405—SALAD DRESSINGS**

Salad dressing contributes much to successful saladmaking, and adds distinctive interest and flavor. Salad dressings serve three major uses in salad preparation:

As a Marinade—Some salads, especially those made with meats, poultry, fish, or potatoes, are improved by marinating. Marinating consists of allowing foods to stand for an hour or longer in the refrigerator in a marinade (usually french dressing, an oil-spice-or-herb combination, or an acid-spice-or-herb combination). Marinating should never be a soaking process; it should be used to coat the ingredients. The marinade should be drained off before another dressing is added, and the salad served.

As a Binder—Simple, basic salad dressings combine salad ingredients and give the mixture body and smoothness.

As a Topping—If salads are already mixed with a dressing, an additional salad dressing "topping" may be used for garnishing and/or flavor appeal. On lettuce wedges or on fruit salads, for instance, a topping of mayonnaise and/or other dressing is an important part of the salad.

**1405-a—SALAD DRESSING CLASSIFICATION AND INGREDIENTS**—There are three

basic types of salad dressings—french, salad dressing (boiled), and mayonnaise. Each of these three has many variations, and all are made with oil as an ingredient. In addition, there are simple dressings such as sour cream or soured evaporated milk.

All of these dressings are made by combining a few simple ingredients. In the basic dressings—french, mayonnaise, and boiled salad dressings—these are oil, acid, seasonings, thickener, emulsifier, and liquid.

**1405-a(1)—Oil**—This ingredient is of prime importance in making salad dressing and must be fresh. Oil tends to become rancid when exposed to light, warmth, and air. Even a film of oil left exposed on the rim of the lip of a container will become rancid quickly, so wipe off any exposed surfaces before storing.

Oil forms an emulsion—that is, oil will suspend in a watery liquid. Emulsions temporarily stay in solution after shaking or beating, then settle into a separate layer. French dressing is an example of a temporary emulsion.

The emulsion can be stabilized so that it will be less likely to separate. In making mayonnaise, eggs and/or eggs with evaporated milk are added to stabilize the oil. Beating divides the oil into droplets which also makes the mixture more stable. Mayonnaise is a semi-permanent emulsion.

To produce a more permanent type of emulsion, starches can be added as is done in the making of boiled salad dressing. Cornstarch plus eggs and proper beating will greatly stabilize oil in salad dressing.

**1405-a(2)—Acid**—Fruit juices and vinegar (cider or wine) are used as the acid ingredient in salad dressings. The proportion and kind of acid used in a salad dressing depends upon the type of dressing being made. There is proportionately more vinegar to oil used in french-type

salad dressings than in mayonnaise and boiled dressing. The acid used in the more permanent emulsions is always vinegar. The acid in french dressing, on the other hand, may be vinegar, pineapple, and/or lemon juice.

**1405-a(3)—Seasonings**—Salt, sugar, and pepper are the traditional seasonings used in salad dressings. Other seasonings, including mustard, cayenne pepper, and herbs of various kinds, add color and alter the flavor of the basic dressings. Monosodium glutamate may be added, if desired.

**1405-a(4)—Thickeners**—Egg yolks are used for thickening mayonnaise. Fresh or frozen eggs may be used. Do not use dehydrated eggs. Cornstarch is used in boiled salad dressing to absorb the liquid. The starch should be added to cold water and carefully cooked prior to combining with egg.

**1405-a(5)—Emulsifiers**—Emulsifying agents used in salad dressing include egg yolks and evaporated milk. Emulsifiers form a film around the small oil droplets, preventing them from clumping together and separating from the liquid.

**1405-b—SALAD DRESSING PRODUCTION**—The basic rule in salad dressing production is to make the dressing well in advance so that the seasonings can blend well. Points on making different salad dressings are discussed.

**1405-b(1)—French Dressing**—This basic dressing is a combination of approximately two parts salad oil and one part acid, plus various seasonings. In addition to its use as a salad dressing, French dressing is also used as a marinade.

The procedure for making French dressing is very simple. Mix dry ingredients together; blend in oil, vinegar, and other ingredients; then shake or beat.

Fruit French dressing is a variation of the basic recipe. In plain fruit French dressing, lemon and pineapple juices are substituted for vinegar. Catsup, chiffonade, Chilean, piquant, and sour cream are other variations of the basic French dressing recipe.

**1405-b(2)—Mayonnaise**—This salad dressing is a combination of egg, salad oil, an acid, salt, and other seasonings. Mayonnaise contains almost twice as much oil as cooked salad dressing, and because no stabilizing agent is added, its preparation presents some difficulty for an inexperienced cook.

The following do's and don'ts should be observed in making high-quality, stable mayonnaise:

DO's

1. Have ingredients at room temperature before mixing.
2. Combine the ingredients in the following order:
  - a. Add seasoning to egg yolks;
  - b. Add oil to seasoned yolks, a little at a time;
  - c. Add oil and vinegar alternately.
3. Beat sufficiently. Make sure all oil is incorporated in mixture before adding more.

DON'Ts

1. Use a mixing bowl that is too shallow. It should be of a size and shape that allows the mixture to be well beaten.
2. Add oil too rapidly for quantity of egg yolks used.
3. Overbeat or underbeat.
4. Store near freezing temperatures, or in overly heated places.
5. Open container and expose mayonnaise to air when not in use.

Color, consistency, and flavor are the important factors in making quality mayonnaise. Color depends largely upon the egg yolks used.

The acidity should give a pleasing tartness. Mayonnaise should be stiff enough to hold its shape when spooned out. Oil influences the flavor and should be free from rancidity. A good dressing should have a slight tang of mustard, the zest of pepper and salt, and the mellowness from, but not the sweetness of, sugar.

The principal cause of poor mayonnaise results from adding oil too fast or not enough beating after each oil addition. To reform broken mayonnaise, it is necessary to start the emulsifying process over with a new egg yolk or another emulsifying agent. Add freshly beaten eggs (four per gallon of mayonnaise), beating thoroughly.

**1405-b(3)—Cooked Salad Dressing**—The base for this dressing is a sauce made with liquid (water or milk), starch (usually cornstarch) or egg, or a combination of these ingredients, plus seasonings and acid. The cornstarch should be dissolved in a portion of the liquid before adding it to heated liquid and/or eggs. Do not over-cook or overheat the mixture because the acid present will tend to thin it out. Cooked dressings may be made thicker than needed and then thinned when combined with other salad dressing ingredients.

Hot bacon dressing and creamy fruit dressing are example variations of the basic boiled-dressing recipe.

## **1406—THE FUNDAMENTALS OF SALADMAKING**

The fundamental principle of saladmaking is selecting prime-quality ingredients. The first test of any quality salad is: "Does it have eye appeal?" Contrasts in color, shape, and texture of salad ingredients provide eye appeal when salad ingredients are fresh.

Another fundamental principle of particular importance in saladmaking is COLD FOODS

COLD. If it is a hot salad, HOT FOODS HOT. If salad ingredients are prepared in advance, they must be refrigerated, or if made up for service, they must be held in refrigeration.

**1406-a—DO'S AND DON'TS FOR USING SALAD GREENS**—Salad greens must be dry when the dressing is added. It will cling better and distribute more evenly.

Finely shredded lettuce loses crispness rapidly. Do not add dressing until just before serving. The dressing should be the last ingredient added to most salads. Avoid using excess dressing. Mixing should be done by tossing the greens and dressing lightly with two forks.

**1406-b—DO'S AND DON'TS FOR COMBINATION SALAD**—Tomatoes or citrus fruits should be the last ingredient added in a tossed salad. These acid foods tend to make other ingredients soggy if allowed to stand in the salad and will wilt crisp greens.

Meats, poultry, fish, and cooked vegetables, especially potatoes, improve if dressings are added before service. The flavor of ingredients improves and the texture is not harmed by adding the dressing well in advance of service and keeping it under refrigeration.

**1406-c—MOLDED SALADS**—The production of molded salads is relatively simple, but a few important facts must be kept in mind because these salads require different preparation techniques from other types. Molded salads in the Navy-Marine Corps Recipe Service are made from flavored gelatin dessert powders as well as from plain gelatin.

The recipes utilizing flavored dessert powders are prepared by dissolving the crystals in hot-to-boiling water and adding cold water and/or vinegar to dilute and cool. The hot mixture should then be chilled to the consistency of unbeaten egg whites. This can be done by re-

frigerating or by placing the bowl over ice. Stir the gelatin mixture occasionally while it is firming.

Fruits and/or finely cut vegetables are then added. If the gelatin is not allowed to thicken first, the cut salad materials will settle to the bottom and leave a layer of plain gelatin on top. After combining gelatin with fruit and/or vegetables, place in baking pan. Molded salads firm up faster in metal containers. Muffin tins or loaf pans may be used, if desired.

Salads molded in sheet pans will come out easily if cut with a pointed knife which has been dipped in hot water. After cutting each pan 6 x 9, run the knife around the rim to loosen the mold. Shake the pan slightly to loosen the slices. Slices should be served on lettuce cups with an appropriate dressing.

Almost all raw and cooked fruits and vegetables can be used in molded salads, but use only cooked fresh or canned pineapple. Unheated pineapple has an enzyme, bromelin, which prevents gelatin from setting.

## **1407—CHARACTERISTICS OF AN APPEALING SALAD**

A perfect salad is one that has a pleasing color combination, that is arranged attractively, and that is composed of foods that are compatible. Ingredients should be fresh and cold; the green raw vegetables and fruits should be crisp.

Consider color and flavor contrasts in planning salads for different meals. Garnish salads for eye appeal. A single green pepper ring, a strawberry, a radish rose, or similar edible garnishes will accent the beauty of a salad. Garnishes are best when simple and should not detract from the salad. (See table A, p. D14-18.)

**TABLE A****GARNISH SUGGESTIONS FOR SALADS**

Beets, slices or julienne  
Bonbons—Marshmallows rolled in coconut  
Carrot curls or sticks  
Celery curls, celery hearts  
Cheese, American, Swiss-julienne, bar, sliced, shredded  
Cheese balls or bars rolled in chopped parsley or paprika  
Cherries, canned or maraschino  
Coconut, plain or colored  
Cranberry relish  
Croutons  
Cucumber slices or curls  
Eggs, hard cooked, sliced, quartered, or stuffed  
Fresh berries or fresh fruit  
Green pepper rings or strips  
Jellies  
Lemon slices or wedges  
Melon balls or wedges  
Nuts, whole or chopped  
Olives, green and ripe  
Onion rings  
Orange twists or slices  
Paprika, dash of  
Parsley, sprig or chopped  
Pickles, all kinds  
Pimiento, strips or chopped  
Pineapple fans or fingers  
Poppy seed  
Radishes, plain, roses, accordion, or sliced  
Strawberries, whole or sliced  
Stuffed prunes or dates  
Sugared fresh grapes  
Tomato slices and wedges

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Select the dressing best suited to the salad ingredients. This may or may not be stated on individual salad recipes in the Navy-Marine Corps Recipe Service.

Serve tart dressings with bland salads; bland dressings with tart foods. A high-quality dressing judiciously used can make the difference between a mediocre salad and one that is particularly tasty. Dressings can be combined for vegetable salads and slaws. For examples of

dressings to suit particular salads, see table B, p. D14-19.

Arrangement of salads is of extreme importance for eye appeal. Use color lavishly but with good taste. Think of the garnish and color of salad ingredients in relation to the rest of the menu, but do not overdo color schemes. Avoid unusual or cluttered appearance of salads. Molds, boats, or fruit baskets are appropriate for special party service, but for most meals, the simple salad is the most beautiful. One radish rose, for example, may be more effective than three.

**1408—SALAD SERVICE**

There are three ways salads may be served in the Navy general mess: (1) From a container on the serving line; (2) as individual salads; or (3) from a self-service salad bar.

**1408-a—SALAD BARS**—The self-service salad bar is an extremely popular type of salad service. The choice of items offered is generous; the self service speeds up the mess line, and salads can be kept colder and less subject to spoilage when kept apart from the hot foods. Raw fruits and vegetables stay crisp and fresh.

Salad bars may be situated in any convenient area in the messhall. Easy access and continuous movement of traffic are important elements to be considered in deciding upon location. One factor is to have the menu posted so that salad bar selections can be coordinated with hot items on the serving line. Another factor controlling the location is whether the salad bar is an electrically refrigerated unit. Salad bars which are refrigerated by a bed of ice more frequently are located in the center of the room and traffic flows on both sides.

Salad bars should be placed so that replenishment can proceed and the various salad selec-

**TABLE B**  
**SALAD-DRESSING COMBINATION SUGGESTIONS**

<b>Salads</b>	<b>Dressings</b>
<b>Fruit Salad:</b>	
Fruit salad.....	Fruit French, creamy fruit French, mayonnaise, salad dressing (boiled).
Grapefruit-orange.....	French dressing.
Pineapple-cheese.....	Salad dressing (boiled), fruit French.
Waldorf.....	Mayonnaise or salad dressing (boiled).
<b>Vegetable-Fruit:</b>	
Apple-carrot.....	Salad dressing (boiled) or mayonnaise.
Pineapple cole slaw.....	Salad dressing (boiled) or mayonnaise.
<b>Vegetable:</b>	
Asparagus.....	French, piquant, mayonnaise.
Carrot combination.....	French, amara mayonnaise, zesty French, and piquant.
Chef's.....	Blue cheese, French, garlic French, zesty French, piquant, sour cream.
Cole slaw.....	Salad dressing (boiled), mayonnaise.
Cucumber-onion.....	Built into recipe.
Green bean, hot.....	Built into recipe.
Green bean, pickled.....	Built into recipe.
Lettuce, heads, wedges..... or Lettuce leaves (or any other salad green such as escarole, chicory, or raw spinach).	Amara mayonnaise, catsup, celery chiffonade, Chilean, French horseradish, piquant, Russian, salad dressing (boiled), Thousand Island.
Perfection.....	Salad dressing (boiled), mayonnaise, French.
Potato.....	Mayonnaise, salad dressing (boiled), or a built-in hot dressing.
Spring or garden.....	Blue cheese, celery, French, French garlic, French zesty, sour cream.
Tomato aspic.....	Mayonnaise, salad dressing (boiled), blue cheese, Thousand Island, zesty French, garlic French.
Tomato, sliced.....	Mayonnaise, amara mayonnaise, French, piquant, Russian, salad dressing (boiled).
Tossed.....	Mayonnaise, blue cheese, catsup, French, French garlic French zesty, piquant, Russian, salad dressing (boiled), sour cream.

tions should be lined up so that the customer does not have to reach over one container to get at another salad. These precautions for self-service salad bars should be observed to maintain proper control over sanitation and correct service.

1408-a(1)—**Proper Refrigeration of Ingredients**—Place all salad-bar items in pans or on trays on a bed of ice, or in an electrically refrigerated salad bar unit. Proper drainage is essential if ice is used to keep salad-bar items chilled. Where the use of ice is not possible, salad bars

should be large enough to accommodate shallow pans or trays of salad bar items which are taken directly from the refrigerated space. The temperature in the messhall makes frequent replenishment of salad materials necessary because these foods cannot be held for long periods in the open air without quality loss. Cooked protein foods cannot be held between 40° F and 140° F longer than a total of 3 hours. This time includes that required for preparing for cooking, as well as for dicing cooked meats, plus the time the salad stands on the mess line during meal service. After the meal, leftover mixtures containing mayonnaise or salad dressing should be disposed of and never returned to the chill box.

**1408-a(2) Serving Equipment**—An adequate number and the proper kind of serving utensils for the salad bar will promote good sanitary practices. These are recommended:

<u>EQUIPMENT</u>	<u>SUGGESTED USE</u>
Tongs . . . . .	Relishes and green, chef and garden, salads.
Straining spoons . . . . .	Cole slaw or fruit salad, or for salads having thin dressings.
Basting spoons . . . . .	Compact mixtures such as potato salad.
Dessert or tablespoons . .	For salad dressings with thick consistency.
Small ladles . . . . .	One ounce capacity for thin dressings.
Food turners . . . . .	Individual salads or gelatin salads served in lettuce cups.

**1408-b—INDIVIDUAL SALADS**—When a large number of salads are being made up, it is more practical to use an assembly-line system. Select a serving plate or bowl for the individual salad. Line up as many plates or bowls as there is room. Stack up five plates high, or less.

The fastest way to put together a large order of salads and the most attractive, uniform results are obtained by adding each ingredient to all the bowls rather than finish off one salad at a time. For example, put the lettuce head down, then use a lettuce leaf which cups, and so on, one ingredient at a time down the line of plates or bowls.

The salads should be arranged so that main ingredients are closest to the salad plates being assembled. Arrange the materials in logical order, placing them on a bed of ice. (See illustration 10, p. D14-21.)

The spud coxswain should concentrate on artistic arrangement of the salad first, then acquire speed after mastering the principles of good salad "design," BALANCE, PROPORTION, and UNITY. Ingredients should be arranged so that every item shows distinctly. Salads that are too "fixed" or too ornate lose eye appeal. Build from the back to the front. The lettuce cup should be placed so that the frilly edge is at the "top" or back of the salad plate. The leaf should not extend over the edge of the plate. Give shape to mixed salads by mounding or molding.

Garnishes are placed carefully so that the eye travels "upward" toward the top of the salads served on plates. Do not make salads too flat. To add some height, chopped lettuce may be placed under the lettuce cup, but do not add so much that the cup topples over.

Putting together individual salads can be time consuming, and orderly arrangement is essential to gaining speed and uniform production.

**1408-c—LARGE SALAD BOWL**—This type of salad service is used more frequently in small messes where space is limited and only one salad is featured. The bowl or pan should be set in a bed of ice so that the salad ingredients

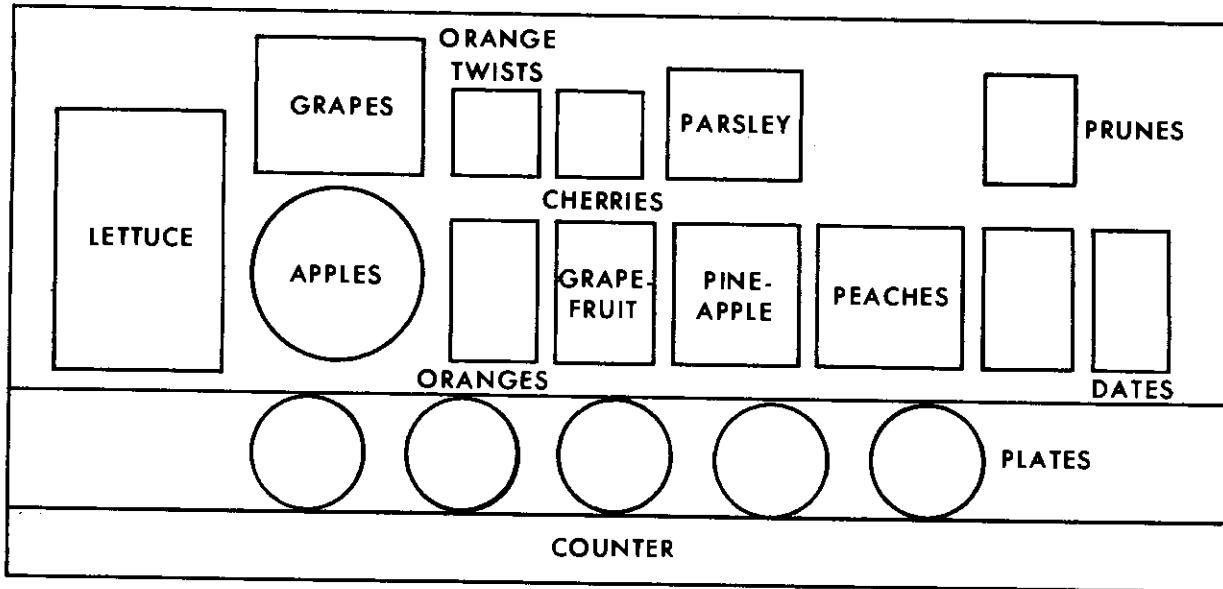


Illustration 10  
How to Set Up a Salad Assembly Line

will stay crisp and cold throughout the serving period. Replenish in small batches. The dressing should drain if salad is added to the first container placed on the line. Too much dressing accumulating in the bottom will wilt salad greens and cause fruits and vegetables to lose crispness.

#### 1409—RELISHES

There are several interpretations of what constitutes the group of miscellaneous ingredients known as relishes. These may be any item which adds zest, flavor, and color to a meal. Most usually they are thought to be a sweet-sour side dish which accompanies meat. Pickled cucumbers, beets, carrots, onions, olives, tomatoes, cauliflower, and cabbage are in this category. In the Navy-Marine Corps Recipe Service there are a number of relishes which are of the sweet-sour type.

In addition, salad-bar items may feature two or three sliced vegetable relishes not combined with dressing which add crispness and color to the meal. Included in this group are:

Curls	Rings
Carrot	Green pepper
Celery	Celery
	Onion

Sticks or Strips	Fans
Carrot	Carrot
Celery	Celery
Green pepper	

Plus

Radish roses and accordians
Cauliflower flowerets
Green onions

Cheese constitutes another group of popular salad items, particularly cottage cheese and cheddar cheese cubes. The cottage cheese is mixed with fruit or vegetables, or served plain.

## PART XV: CAKES AND COOKIES

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## PART XV: CAKES AND COOKIES

### 1501—INTRODUCTION TO CAKES

Cakes and cookies are popular desserts in the Navy mess. Wide menu variety is possible; varied shapes, frostings, or fillings can be used on a few basic recipes; cakes are easily made in large quantity; and they are less perishable than many other types of desserts. Service, too, is greatly facilitated because these products can be made up ahead of need.

To produce successful cakes and cookies, the baker must understand thoroughly the principles and techniques required for their production and use carefully tested recipes. The balance of ingredients must be precise. To produce optimum quality products, a high degree of technical skill is required to obtain proper results.

### 1502—CLASSIFICATION OF CAKES

Cakes can be divided into three separate groups. The proportion and type of ingredient used serves as the basis of differentiating each of these three groups:

1. Batter cakes, or cakes containing shortening.
2. Foam, or cakes without shortening.
3. Chiffon cakes (containing both batter and foam mixed separately and combined).

The subdivision of the three main classifications are many and, generally, depend upon the method of incorporating the ingredients, and variation of ingredients added to basic recipe.

1502-a—**BATTER CAKES**—Cakes containing fat, or batter cakes, include:

Pound-Type (or loaf cakes) containing high percentages of fat;

Plain, Basic-Type (or layer cakes) containing smaller percentages of fat;

Chocolate Cakes (or cakes incorporating cocoa and soda), such as:

1. DEVIL'S FOOD, a mahogany-colored cake with a rich, open texture.
2. FUDGE, a less red and dark brown cake.
3. MILK CHOCOLATE, or mocha or delicate brown cake.

1502-b—**FOAM CAKES**, or cakes containing no fat include:

Meringue Cakes in which only egg whites are used for foam; and

Sponge Cakes in which whole eggs or egg yolks (or a combination of these) are used for foam.

1502-c—**CHIFFON CAKES**—Cakes containing both foam and batter, mixed separately, and folded to a mixture are known as chiffon.

### 1503—CAKE INGREDIENTS

High-quality cakes can be made only with good ingredients. There is a wide assortment of items used to produce cakes for the Navy general mess. There are, however, six ingredients that are used in the production of most cakes, and these are flour, sugar, fat, eggs, salt, and

leavening. Each of these ingredients vary not only in quantity used and in method of incorporating, but in kind as well. It is most essential that bakers recognize the function of these ingredients in various cake formulas.

1503-a—**FLOUR**—Cake formulas in the Navy-Marine Corps Recipe Service are based on soft, white wheat flour, bleached type. Soft wheat flour produces fine cell walls and a fine grain and texture. This flour has a protein content of 7 to 9 percent, and is well bleached. The use of this flour in cakes is essential to high-standard production, because flours of low protein content reduce the possibility of toughness developing. Bread flour, by contrast, contains more protein. (For a discussion of flours, see Part I, "Basic Principles of Food Production," par. 103-c.)

Flour furnishes structure to the cake and is used to hold the other materials together, stabilizing the batter during mixing. Strength of flour to hold gas, a property of great importance in bread production, is less desirable in cakes. Moisture absorptive power of cake flours, however, is essential. The least amount of flour used in cakes the better. The more absorption flour has, the greater moisture held and the less the possibility of gluten development. Bleaching helps the flour to carry more sugar and shortening as well as water. All flours procured for the military services are bleached. Only for special cakes should hard wheat (or bread) flour be used because the high protein content of this flour will give a tough and dry product. Hard wheat flour is blended with soft wheat flour in the formulas for some cakes. (See illustration 1.)

Strength in cake flour may not be directly linked with its protein content as is the case with bread flours. Toughness is linked with high protein content in cake flours, however, and this is an extremely undesirable quality in all types of cakes. Strength in cake flour means that it is capable of holding the greatest percentages of sugar and liquid and at the same time produces the necessary volume to give lightness and good texture.

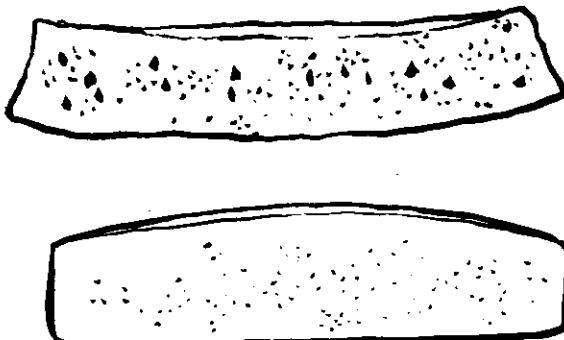


Illustration 1

Differences in Cakes Made From Bread Flour (top) and Cake Flour (lower)

To test a flour to determine its strength, tolerance, and absorption power, one should use a rich yellow cake formula, high in sugar, shortening, and water. Usually, high extraction flours will not perform well under this test, and if improperly bleached, the cake will shrink when removed from oven, and the eating quality will be poor. This condition may be arrested by reducing the shortening and sugar in the formula and increasing the quantity of eggs to compensate for the inadequacies of the flour. A flour with good tolerance (or ability to perform even with variations in the formula and machine manipulation) will give good quality cakes if proper amounts of sugar and liquid are added.

1503-b—**SUGAR**—The type of granulated sugar issued to the general mess is suitable for cake production. If finer grained sugar is required, or if it does not dissolve rapidly, ROLL THE SUGAR with a rolling pin.

Sugars supply sweetness and tenderizing effects to cake, softening the flour protein and starches. Sugars give cake a good color at proper temperatures. Sirups such as corn sirup, molasses, or honey are used either for the particular flavor furnished, or as a moisture agent. Any type of sugar used in cake batters has a tendency to make the batter more fluid, but brown sugar is much more moist and acts like sirups in retaining cake moisture.

Brown sugar is used in many cakes because of its flavor enhancing capabilities. Brown sugars are graded according to color, and contain varying quantities of molasses. In making substitutions of brown for white sugar, use weights, not measures.

**1503-c—FAT**—Cakes may contain either oil, lard, butter, or hydrogenated shortening compound, with or without emulsifiers added. The function of fat in cake is to "lubricate" its internal structure, giving it the capacity to entrap and hold air and moisture, and produce a tender product.

To fulfill these functions, fats must be thoroughly and sufficiently broken up and dispersed throughout the batter. The dispersion of fat can be accomplished by the mixing operation, but fats vary in their capability to become dispersed in a cake mixture. Butter and hydrogenated shortening compounds are easily manipulated, and yield cakes of maximum volume, other factors being adequately controlled. Hydrogenated shortening may have an ingredient known as an emulsifier (technically known as a mono- or di-glyceride) which aids the distribution of fat in a mixture. The increased emulsifying properties of such hydrogenated shortening compounds enable the baker to obtain a cake of large volume, fine grain, and moist, even texture, with less effort and skill. A cake made with emulsified shortenings does not require as much creaming action because the fat is dispersed more efficiently.

Oils and lard are used relatively infrequently in cakes. Salad oil is an ingredient in chiffon cakes but tenderness is more dependent upon air incorporated in large quantities of eggs. Plastic fats—butter and hydrogenated shortenings—which can be creamed produce more tender cakes than do oils which are not conducive to creaming action.

Butter has distinctive properties for cake production. Optimum-quality butter lends a delicately delicious flavor to cakes. It is capable of good creaming action. It may be used as the

only source of fat, but it is best to blend it with shortening compound for several reasons. Butter is only about 80 percent fat (the balance being mainly liquid) and does not have as efficient creaming power as the emulsified hydrogenated shortenings. Because butter contains varying quantities of liquid, formulas may have to be adjusted for total liquid as well as fat content when using it for other fats. If substituting butter for shortening, use 18 oz of butter to each 16 oz of shortening; or substitute 10 to 15 percent less shortening in recipes specifying butter.

The Navy-Marine Corps Recipe Service specifies the use of hydrogenated shortening compound in most cake recipes. Shortening compound, as the name implies, is made from a blend of various kinds of fat. These fats are prepared in such a way as to yield a neutral-tasting product and one that is workable, or creams well. Both of these fat properties are extremely important to producing quality cakes. Shortening compounds have a plastic working range from 60° up to 85° F, although the best creaming action can be obtained at about 75° F.

**1503-d—SALT**—Salt is used in production of all cakes, and serves the very important function of strengthening the egg and flour protein. Salt also flavors the cake by enhancing the flavor of the other ingredients in the cake.

**1503-e—EGGS**—Eggs, one of the most expensive ingredients in cakes, contribute to cake structure and texture by working with the gluten in the flour. Eggs bind the batter and help to stabilize it. Eggs supply some leavening action through whipping properties that incorporate and hold air and allow its expansion during baking; act as an emulsifying agent because of the relatively high fat content of the yolk (27 percent); and add color, flavor and eating quality.

Eggs are used in three forms in cake baking: Fresh shell, frozen whole baking-type, and dehydrated eggs.

Fresh eggs vary in size, and therefore the yield of a given number of eggs differ. Always weigh fresh eggs broken out of shell for use in cakes. Fresh frozen whole eggs, properly thawed, should be thoroughly stirred after thawing, then weighed. For proper defrosting methods, see Part III, "Eggs, Egg Mixtures, and Cheese," paragraph 305-c. Frozen eggs can be used interchangeably with fresh whole eggs in cake production.

Dehydrated eggs are successfully used in most batter-type cakes and cookies. Their performance in foam-type cakes is less desirable. In foam-type cakes, whipping properties of eggs (whole, whites, or yolks) are extremely important in determining final cake volume, lightness, structure, and tenderness. Less importance is attached to the whipping properties of eggs used for batter cakes because these cakes are less dependent upon the incorporation of air for leavening. Baking powder and/or soda is used for leavening these cakes.

Because eggs are a major ingredient in cake production, it is imperative that the proper quantity and quality be consistently precise. Thin, watery egg whites will decrease the lightness and strength of a cake. Such egg whites do not whip well, and neither do those which contain even slight amounts of grease or traces of fat from egg yolk. As little as 1/10 of 1 percent will adversely affect whipping quality.

**1503-4—LEAVENING**—Cakes are leavened in three ways: Incorporation of air during mixing; chemical leavening agents; and through vapor pressure created in the oven. For a discussion of chemical leavening agents, see Section D, Part I, "Basic Principles of Food Production," paragraph 103-d.

The kind of leavening used in cakes depends upon the richness of formula, consistency of batter, and baking temperature.

All three leaveners produce lightness or po-

rousness that give cakes their characteristic texture.

**1503-4(1)—Air**—Air is incorporated into cake batter by manipulation. The amount incorporated depends upon such factors as: how many times flour is sifted; speed of hand or machine mixing; and type of mixing method used. Eggs are the ingredients that entrap and hold air.

**1503-4(2)—Chemical Leaveners**—Baking powder is the most common chemical leavening agent used in cakes. This leavener liberates carbon dioxide gas when it comes in contact with a liquid, the amount and the speed with which it is supplied are dependent upon the type baking powder used.

**1503-4(3)—Soda**—In many cake formulas, soda is used to generate carbon dioxide gas and contribute to the lightness of cakes. When soda is used, the formula also contains a moist acid ingredient such as sour milk, vinegar, molasses, or honey because it is this soda-acid combination which produces carbon dioxide gas. In recipes specifying the use both of the baking-powder-and-liquid combination plus soda and an acid-liquid combination, less baking powder is used than when baking powder is used as the only chemical leavener. Since soda is a constituent used in the production of baking powder, use extreme care in measuring or weighing either/or both baking powder and soda so as to preclude an excess of these critical ingredients in cakes. Underweighing or measuring also will produce disastrous results in cake production.

**1503-4(4)—Steam/Water/Vapor**—Some leavening action is afforded cakes by steam or water vapor given off from the liquid in the cake batter during baking. Cakes low in moisture with rich ingredients, such as poundcakes, obtain most of their leavening from mixing operations (air incorporation), and require less or no chemical leavening. Cakes made from lean formulas high in moisture require more. An example of the latter type is batter cakes.

## 1504—CAKE FORMULA BALANCE

Formula balance means the combination of ingredients in such proportions to produce the most acceptable cake. The general relationship of ingredients that have to be brought into balance differs according to the type cake.

**1504-a—BATTER-TYPE CAKES**—The following discussion on the general principle basic rules used to balance and proportion ingredients in cake formula shows a series of batter-type cake ingredient proportions on which other ingredients depend. These are:

- (1) The weight of the fat should not be over  $\frac{1}{2}$  of the weight of the sugar.
- (2) The weight of the fat should not exceed the weight of the eggs. Eggs should equal or exceed shortening.
- (3) The weight of the sugar should exceed the weight of the flour, except for these:

Type Cake	Sugar Should Exceed Flour (Percent)
a. Yellow layer . . . . .	110-140
b. White layer . . . . .	110-160
c. Chocolate or devil's food layer . . .	110-180

(4) The weight of the total liquid (milk plus eggs, not weight of dried milk or eggs because these should be calculated on a reconstituted basis) should equal the weight of the flour, but should exceed the amount of sugar by approximately 25 to 35 percent.

(5) Baking powder is usually 6 percent for lean formula and 4 percent for rich. Lean formulas require more chemical leavening because less air is incorporated during mixing.

(6) Salt and other ingredients vary.

(See illustration 2.)

**1504-b—FOAM-TYPE CAKES**—In general, formulas for sponge cakes are balanced easily because there are relatively few ingredients involved. The working principle is that the amount of sugar is balanced against the eggs to

equalize any tendency of the texture to be too tender or, on the other extreme, too tough. The amount of liquid used is balanced against the amount of eggs (which also furnish liquid) to insure that the sugar is dissolved. The following general rules apply:

- (1) The weight of the sugar should equal or slightly exceed the weight of the whole eggs.
- (2) The combined weights of the liquid in the whole eggs and the milk or water should be about  $1\frac{1}{4}$  times greater than the weight of sugar.
- (3) The weights of either the sugar or the whole eggs should exceed that of the flour.
- (4) The combined weights of the whole eggs and the flour should exceed the combined weights of the sugar.

(See illustration 3, p. D15-6, and illustration 4, p. D15-7.)

In other words, a baker developing or altering recipes has a number of basic cake formulas which are varied to adjust batch quantities or to substitute ingredients; for example, one type of liquid substituted for another. Good judgment in balancing formula is always as necessary as technical skill, as any experienced baker will testify.

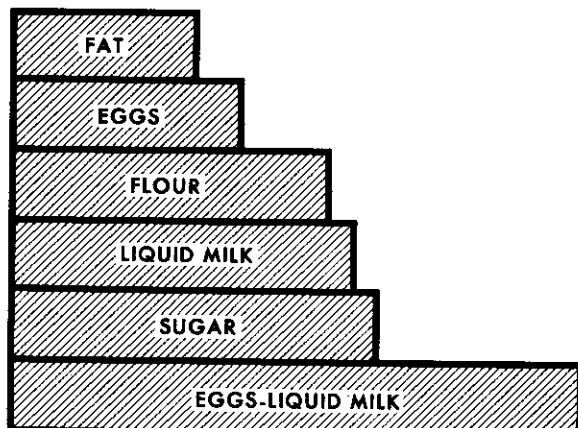


Illustration 2  
Batter-Type Cake Formula Balance Diagram

(Note relationship of ingredients one to another. Each of these balances has an end limit that it will tolerate. If the balance swings too far, however, it will upset the formula and the quality of the cake will be affected.)

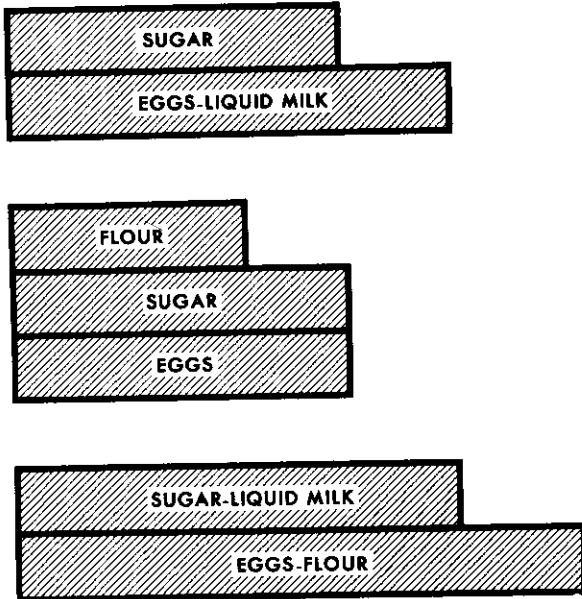


Illustration 3

Foam-Type Cake Formula Balance Design

## 1505—MAKING CAKE FORMULA SUBSTITUTIONS

When substituting one ingredient for another in cakes, formula balance always is necessary, and the general rules discussed in paragraphs 1504-a and 1504-b should be applied in such cases. It is not always essential to use the exact ingredient called for in a recipe if the formula has been balanced accordingly. Some of the more common substitutions are discussed.

**1505-a—REPLACING FRESH OR FROZEN WHOLE EGGS WITH DRIED EGGS**—For best results in batter cakes, do not reconstitute dried whole eggs prior to use in a recipe. Substitution ratios and information on how to reconstitute the dried product for other uses may be found in Section D, Part I, "The Basic Principles of Food Production," paragraph 103-a.

**1505-b—REPLACING WHOLE MILK WITH OTHER TYPES OF MILK**—Substitutions for

whole milk should be made according to Table D, Section D, Part I, "The Basic Principles of Food Production." Care should be exercised particularly in substituting nonfat dry milk in cake batters because too much gives an undesirable crust color.

**1505-c—SIRUPS OR LIQUID SUGAR**—When sirups or liquid sugars are used in place of ordinary sugar or sucrose, balance the cake formula by reducing the amount of moisture.

The usual syrup replacement for granulated sugar is 15 percent. Rarely does it exceed 25 percent because the cake end product would tend to be gummy, have dark crust and crumb and be tight grained.

## 1506—BASIC FORMULA

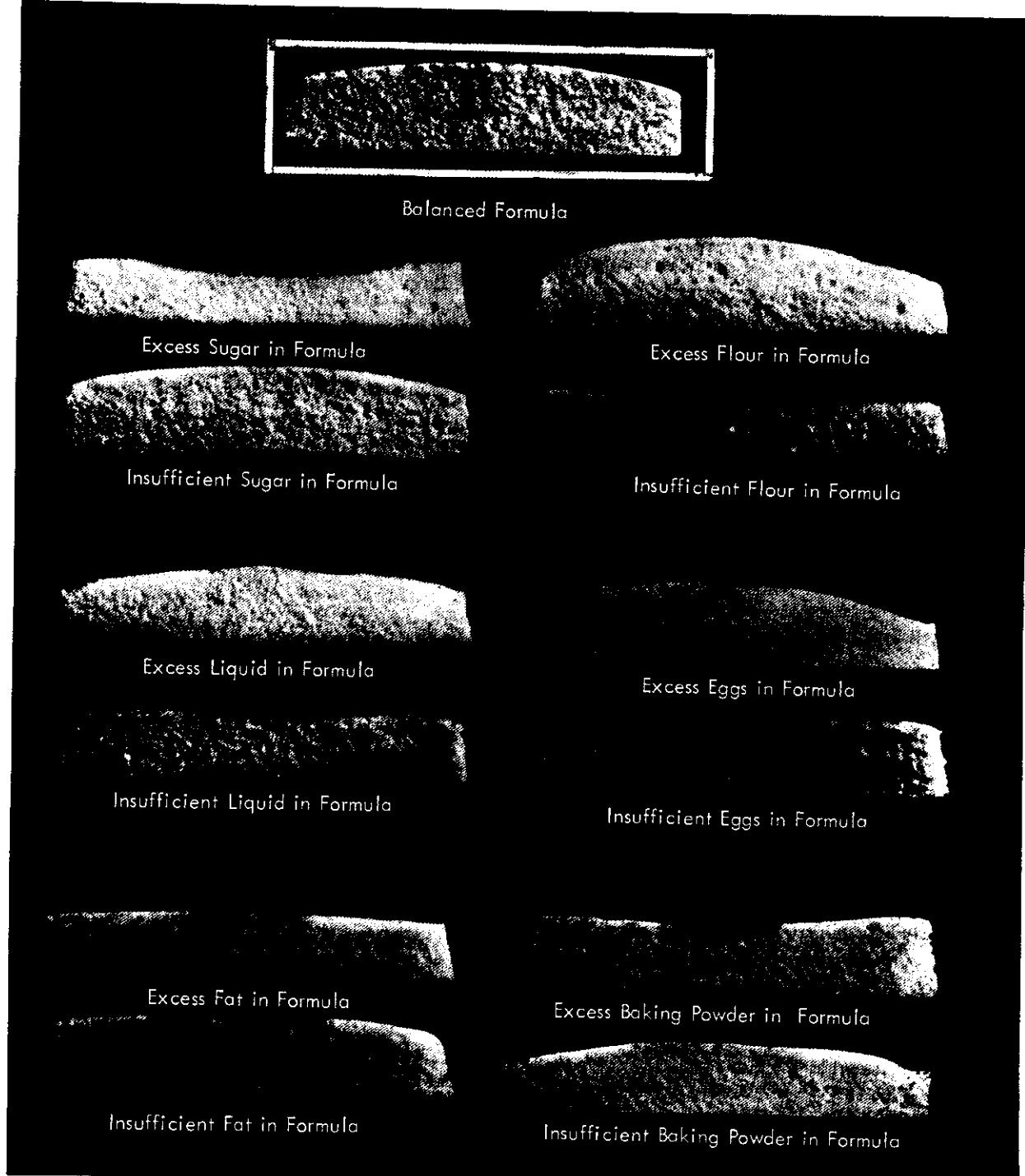
All basic formula balance is specified as percentages. Flour is 100 percent and the proportion of other ingredients is stated as a percent of the total flour.

**1506-a—PLAIN BATTER CAKE**—(Includes sheet, layer, loaf, and cupcakes as well as poundcakes).

The basic ingredients for a batter or layer cake are shortening, sugar, eggs, liquid, flour, and a chemical leavening agent. Ingredient proportions are based on the following ratios:<sup>1</sup>

	Percent
Flour, soft wheat . . . . .	100
Shortening . . . . .	45
Sugar . . . . .	125
Eggs, whole . . . . .	70
Liquid (usually milk) . . . . .	100
Baking powder . . . . .	6

<sup>1</sup>For a discussion of formula construction, see Part VI, "Yeast-Raised Products," par. 603.



**Illustration 4**  
**Examples of Batter-Type Cakes Made From Balanced and Unbalanced Formulas**

Proportion of ingredients will be found to vary from this standard in many recipes. The variation of the poundcake to the batter cake is one example. The basic ingredients for the original poundcake recipe were flour 100 percent, shortening 100 percent, sugar 100 percent, and eggs 100 percent. In other words, a true poundcake formerly was made up of pound for pound of flour to shortening to sugar and to eggs. Because of the high amount of air incorporated in the creaming of the shortening and eggs, poundcake recipes frequently specify no leavening agent. Liquid is not required because the high ratio of eggs contributes all the liquid required. The Navy poundcake recipe is not typical, however, because it has liquid and a leavening agent. It resembles the batter cake, a type falling somewhere in between pound and batter cake.

Formula for chocolate cakes depends upon the type being produced, that is, devil's food, fudge, or light chocolate. Basically, these are produced by a variation of the plain-batter cake formula. Flour or liquid is varied according to the amount of cocoa incorporated. When using cocoa in a formula, it must be considered as a drier and the liquid ingredients are increased by the weight of the added cocoa. Devil's food cake, having the largest amount of cocoa, has less flour than fudge cake which has a lesser amount of cocoa. Chocolate cake, on the other hand, has the least amount of flour of all three. Soda is an ingredient used in all chocolate-type cakes to promote color and to help leaven the batter. Soda enhances the cake color, promoting a reddish brown or mahogany color to the crumb, but if a dark color is desired, soda may be eliminated altogether.

**1506-b—FOAM CAKE**—Foam-type cakes are a class of cakes which are leavened by air whipped into and entrapped in the egg portion of the mix. The expansion of this air, and vapor pressure created by heat in the baking process, causes them to rise.

Foam-type cakes are divided into two main groups and are differentiated as angel food, in

which egg white portion of egg is used to entrap air, and spongecake, in which mixture of whole egg and yolk is whipped with sugar to entrap air.

Basic spongecake is composed of four essential ingredients, which are flour, eggs, sugar, and salt. There are several methods of mixing and aeration and this has a definite influence on the baking powder and water.

**1506-c—CHIFFON CAKE**—The ingredients used in this type cake are partly those making up batter-type cakes, but a larger quantity of eggs is used while there is less flour, fat, and liquid. A batter is formed by the thorough blending of the water, flour, oil, and part of the sugar and egg. This batter is lightly folded into a foam consisting of beaten egg whites and sugar.

## **1507—CAKE MIXING METHODS**

The cakes produced in the Navy general mess are mixed by several methods, not by any specific one, and are dependent upon the type of cake being prepared.

There was a period in baking history when the CONVENTIONAL METHOD, or creaming method was conceded to be the best method for batter cakes. As time went on, this method became more and more modified as new products used as cake ingredients came on the market. Plasticized shortenings, finer granulated sugar, and better quality flours, for example, took a lot of the work out of cake production. These products are manufactured with built-in worksavings so that the baker can spend less time in large-scale cake production and still obtain high quality.

Numerous mixing methods are used in commercial cake production including one-stage (or quick-mix method or one-bowl method); two-stage; and the multiple stage, or blending

method. While the texture of the cake made by the conventional creaming method is usually open, feathery, and quite delicate, cakes made by the blending method will be slightly more moist, have a tighter, more velvety crumb, and be more compact.

Additionally, there are variations used in the spongecake method to produce regular sponge and chiffon cakes.

#### 1507-a—BATTER-TYPE CAKE METHODS

The majority of batter-type cakes in the Navy-Marine Corps Recipe Service are mixed by the creaming method, although other mixing methods are also employed.

1507-a(1)—Conventional or Creaming—The shortening and sugar are creamed until light; gradually add eggs and cream; and carefully add water alternately with flour.

Best creaming action occurs if the temperature of all ingredients is from 75° to 80° F. If the quantity of eggs to shortening is high or the eggs are cold, curdling of the creamed mass may occur. Some bakers may claim that fine curds are not harmful to the final cake quality, but allow the eggs to warm up to room temperature.

The mixing paddle is recommended for creaming. First the sugar and shortening are creamed at low or medium speed (on three-speed machine) until it is waxy and quite workable. Mixing continues at medium speed until the mass is light in color and fluffy in texture. During this, and subsequent mixings, the mass is scraped down frequently with a spatula, care being taken to see that ingredients on the bottom are drawn up into the mixing area.

Eggs are next added and mixing is continued at medium speed. The mixture should continue to increase in color and lightness. The eggs should begin to dissolve some of the sugar and

the grainy texture should disappear and a smooth, even mixture begins to form. Some cake recipes may call for only the yolks in the creaming stage, the whites being beaten separately and added at the end of the mixing just before panning. If this is done, slightly less baking powder or soda is used in the formula.

The interactions that occur in the creaming process should be understood if optimum-quality cakes are to be obtained. The rough edges of the sugar assist in bringing air down into the shortening and sugar mass. At the same time, the shortening attaches itself to the sugar. This attachment of sugar and shortening helps give desirable spread to the shortening throughout the batter in the later stages of mixing. The eggs assist in emulsifying the shortening and also increase the ability of the mass to incorporate more air. Tiny air cells must be widely distributed throughout the batter and this air retained in subsequent mixing. Thorough and fine division of sugar, shortening, and eggs must be achieved if a delicate, fine texture is to be obtained.

After the mixture is sufficiently creamed, the dry ingredients sifted together are added alternately with the liquid. Mixing is at low speed with the paddle. Usually the addition of the dry ingredients and liquids is best accomplished in seven additions beginning and ending with dry ingredients. This will give four additions of dry ingredients and three of liquid. Mix enough to develop flour gluten and to secure complete incorporation of ingredients and a smooth batter. Four to seven minutes may be required.

The batter of a conventionally mixed cake will be somewhat thick; however, it should be delicate and light. The batter should be accurately panned and then spread with a spatula. See that the batter is evenly distributed and then give the pan several sharp raps to force out any free air bubbles. (See illustration 5, p. 15-10.)



Illustration 5  
Example of an Improperly Mixed Cake

If the egg whites are beaten separately and added last, the foam developed should be one that makes soft, glossy peaks that bend over. Sometimes a part of the sugar is reserved and blended with these egg whites to make a meringue. When this is done, the egg whites are not as fragile. The technique of folding in these egg whites so as to obtain maximum incorporation of air is a folding action of bringing the egg whites down into the batter and the batter over the egg whites in an over-and-under continuous circular motion. If the egg whites are blended into the batter by machine, use low speed and mix only until the whites are thoroughly blended into the batter.

**1507-a(2) Single Stage**—This is variously referred to as a quick-mix, a streamlined, one-bowl, or single-stage method. The single-stage method is being used increasingly for high-quality production of most cakes commercially produced. The advantages are labor and time saved. Mixing time and ingredient temperatures are the chief controls. In this single-stage method, the mixing operation obtains A FAST BREAKUP AND INCORPORATION OF THE INGREDIENTS. All ingredients should be room temperature. A whip (which is a combination of many beaters or paddles) accomplishes this breakup very rapidly. The formula for any batter cake made by this method should be altered because the whip incorporates a great amount of air; therefore, baking powder should be reduced by 10 percent.

Using a three-speed mixer, mixing time for a 25-lb batch of yellow cake would proceed as follows:

Mixer Speed	Time (Minutes)	Step
1st . . . .	½	Wets ingredients.
3d . . . .	2	Breaks up and incorporates ingredients.
2d . . . .	2	Distributes air finely throughout mass.
1st . . . .	1	Eliminates large air pockets; refines air cells.

This method is not used generally in recipes of the Navy-Marine Corps Recipe Service.

**1507-a(3) Two Stage**—In the two-stage method place all dry ingredients into mixing bowl with a portion of liquid and mix for the specified mixing period. Remaining liquid portion is added gradually, and then mixed for a required mixing period. There are different variations of the two-stage method, one variation specifies the addition of egg and a portion of the liquid after the other ingredients are mixed, but the method is basically the same.

**1507-a(4) Multiple Stage or Blending**—The basic blending method is to mix the fat and flour with a paddle at low speed for 3 to 5 minutes. Scrape down frequently. Sugar, salt, soda or baking powder, dry milk, solids, and from  $\frac{1}{3}$  to  $\frac{1}{4}$  of the liquid are added and mixing at the same speed is continued for 3 to 5 minutes. Cocoa, spices, and other dry ingredients, if in the recipe, are usually added at this time. The eggs, remaining liquid, and flavoring are added last and mixing continued at low speed for another 3 to 5 minutes. The addition of liquid in two stages is necessary to give a smooth batter in which the ingredients are thoroughly blended. The resulting batter will be much thinner than that obtained in the conventional method and will usually pour from the mixing bowl and require much less spreading. The thinness of the batter is no indication of the lack of quality in the final cake. Follow the steps and times of mixing accurately. Undermixed cakes develop

a coarse grain and toughness; overmixing causes tough, compact cakes.

Commercial cake mixes are mixed by the blending method. Sugar, flour, shortening, emulsifiers, dried eggs, nonfat dry milk, salt, and the other usual cake ingredients are blended together on special ribbon and/or high-speed blenders. Liquid (usually water) is added to the mix at a rate of approximately 50 percent of the dry mix weight. About  $\frac{1}{2}$  of the liquid is added first and the mixture mixed at low speed for about 1 minute, then for 2 minutes at medium speed. The remaining water is added gradually, and the mixing is continued for 3 minutes at slow speed, then 2 minutes at medium speed. The mixture should be scraped down several times during each of these mixings. The cake is then mixed about 4 minutes at medium speed.

**1507-b—FOAM CAKE MIXING METHOD—**  
The spongecake is mixed by whipping eggs and sugar (or portion of sugar) together until stiff. The remaining portion of ingredients are blended together and folded into beaten egg mix.

Since foam cake depends almost entirely upon the air incorporated in the beating of eggs for their leavening, optimum conditions must be present if a stable foam of maximum volume is obtained. Cold eggs take longer to whip. The eggs should be about 65° F. Other ingredients should also be at room temperature (or above) when they are blended into the eggs. Adding salt and an acid such as lemon juice at the beginning will assist in forming a good foam.

The typical spongecake will be made from whole eggs beaten for about 7 minutes. The addition of part of the sugar at the start of the beating may make the foam develop more at high speed. The whipped mixture of whole eggs and sugar should be thick and have a light, lemon color. If only egg yolks are used, a liquid of hot water, milk, or lemon juice may be added during the beating. After the eggs

are beaten to the desired degree, the sifted flour is carefully folded in. If baking powder is used, sift with the flour and carefully fold this mixture into the beaten eggs.

The folding in of the flour is a critical factor in the making of a successful cake. It is necessary to fold in the flour without loss of the air incorporated in the beating. Some recipes may call for a part of the sugar to be sifted together with the flour and this mixture folded into the eggs. This technique makes it possible to blend in the flour more easily and quickly. The folding action used should be that of sifting about  $\frac{1}{3}$  of the flour over the beaten eggs and then with a down-under-up-and-over motion bring the flour and eggs together.

The flour may also be blended into the eggs by using a whip on a machine at low speed. If mixing is inadequate to give thorough blending of the flour and the eggs or if the eggs are underbeaten, a heavy, tough layer may appear on the bottom of the cake and the cake will have low volume and a heavy, compact grain. Overbeating will give a tough and dry cake with poor volume.

Spongecakes have hot water added to them after the flour is blended; usually the temperature is around 110° F. The blending of additional ingredients should be accomplished so that there is no loss of air from beaten eggs.

**1507-c—CHIFFON CAKE MIXING METHOD—**  
Chiffon cakes are made much like spongecakes except that they contain oil and have batter incorporated in them which results in a heavier, tighter structure.

The batter, consisting of the water, flour, oil, and part of the sugar and eggs, is blended thoroughly. This batter is folded lightly into a foam consisting of egg whites and sugar. The baked cake resembles a foam-type cake more than a batter-type cake.

## 1508—PANNING CAKES

Navy-Marine Corps Recipes have been developed to give yields indicated on the recipe card if scaling procedures are followed and standard-size pans used. Two pans are standard for cake production in the Navy mess: The sheet pan measuring approximately 18 x 26 x 1½ in and the loaf pan measuring 14½ x 4½ x 3½ in.

Grease pans well for batter and pound cakes. Dusting with flour, at least on the bottom, will reduce tendency to stick. Sometimes paper liners are placed on the bottom to assist in removing the cake after baking.

Paper liners save time and prevent the excessive use of grease and flour. Greater volume is obtained if foam cakes are placed into pans with ungreased sides. This ungreased edge gives the cake a base on which to attach itself, as it rises and bakes. To prevent a bottom crust on a spongecake that is to be rolled, lightly moisten the paper liners placed on the bottom of pans. Chiffon cakes should be baked in ungreased pans.

Handle bakery pans with care. Do not bang them around or handle in such a manner that they lose their level surface and shape.

## 1509—SCALING CAKES

The amount of batter scaled in a given size pan and the depth of that pan are very important factors in determining whether the cake is moist or dry. For example: A sheet pan (18 by 26 in) will require 6-7 lb of battercake, 5 lb spongecake; a loaf pan 14 x 4½ x 3½ will require 5 lb fruitcake batter, and only 3¾ lb poundcake batter. Scaling batter is extremely important to the prevention of moisture loss from the cake during baking. (See illustration 6.)

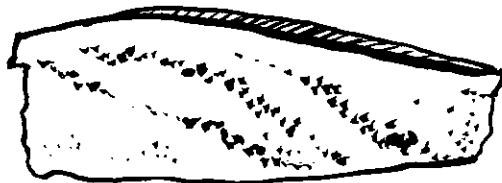


Illustration 6

Example of a Batter Cake Scaled Too Heavily

## 1510—BAKING CONDITIONS OF CAKES

The baking of the cake is a process in which the proteins in the flour, eggs, and other ingredients coagulate and the starch in the flour and other ingredients swells and absorbs moisture, causing the structure to become firm. Usually this baking proceeds in four steps. At first, the batter becomes somewhat more fluid and there is a rapid development in volume. The surface is flat. Next, rising continues with the center of the cake becoming higher than the edges. Bubbles are seen at the top. Some firmness of the batter is evident at the edges. Third, there is no more leavening action and the cake begins to set. In the fourth stage, the structure is set and a baked aroma is quite noticeable.

Battercakes will shrink slightly away from the sides of the pan and there will be a slight, very slight, loss in volume when done.

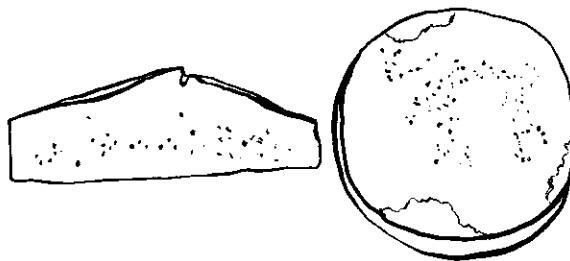
A test of doneness: Touch the top center of the cake, and if the impression remains, it needs additional baking. If a toothpick or wire tester is inserted into the cake, either will come out clean and free of excess moistness.

## 1511—BAKING TEMPERATURES AND COOLING PERIODS FOR CAKES

Use the oven temperature recommended for the baking of the cake in the Navy-Marine Corps

Recipe Service card or packaged cake-mix instructions. Usually cakes baked in sheet pans can be baked at slightly higher temperatures than larger or deeper cakes. A cake baked at too high a temperature will have a peaked and perhaps a cracked center, an overly brown crust, will shrink excessively and have poor flavor. On the other hand, a cake baked at too low a temperature will have poor volume. (See illustration 7.)

Chocolate cakes are quite susceptible to high temperatures or overbaking. Too high a temperature in the baking of a foam cake will cause the air in the batter to swell excessively and so rapidly that the mixture of flour and eggs surrounding the foam does not have time to firm sufficiently to retain this gas. As a result, the cake will collapse when it comes from the oven. This collapse may even occur in the oven. Oven floors should be level. (See illustration 7.)



Example of a battercake baked in too hot an oven.



Example of a cake baked at too low temperature.



Misshenen cake resulting from uneven oven floor.

Illustration 7

Baking Conditions Affecting Cake Quality

Do not place pans touching but allow some space so that heat can circulate around the pan. Good even heat is required and temperatures should not vary. The heat for most cakes should come from under the cakes and rise and circulate around. It may sometimes be desirable to reduce the quantity of heat that rises from the bottom and increase the overhead heat such as in the baking of jellyrolls where it is desirable to avoid the forming of a hard bottom surface.

Cool cakes at least 15 minutes or longer if they are to be removed from the pans. The cooling time will depend upon the size and shape of the cake. Pressure from dumping while hot may cause cakes to break. Foam cakes should be cooled to about 110° F before removing from the pans. Invert the pans immediately after removing from the oven for proper cooling.

Because of space limitations onboard ship, most types of cakes are allowed to cool in the pans in which baked. After cooling they are frosted and served from the pan.

If space permits, and it is desired to remove the cake from the pan, cut around the sides of the pans to free the cake. Take another clean pan of the same size and set the outside bottom down over the top of the cake lightly. Quickly invert, allowing the cake to fall out of the pan. Remove any paper liner and allow the cake to complete cooling. Allow loaf or pound cakes to cool about 30 minutes before attempting to remove them from their pans. To remove a loaf cake or a foam cake made in a loaf pan, loosen the cake from the sides with a spatula or knife, tilt, and draw the cake out gently.

## 1512—SELECTION OF FILLINGS AND TOPPINGS FOR CAKES

To frost a cake, see that the icing is of proper consistency to spread easily and yet hold its shape. Approximately 1 qt of icing will be required per sheet cake. Distribute the icing in

approximately six even portions on the sheet and then with a spatula work back and forth the length of the sheet distributing the icing evenly up to the edges and evenly in depth over the cake. (See illustration 8.)



Illustration 8  
Spreading the Icing

Cakes should be iced sufficiently in advance of cutting to allow the icing to firm properly for cutting. This time is usually at least an hour. To cut cakes, select a sharp, straight-edged, thin-bladed slicing knife. Dip into warm water before each slicing operation or as required to keep the knife free from frosting and cake crumbs. Mark off the cake. Cut with a light touch with an even, sure stroke of knife. If the cake is a loaf cake, fruitcake or if the icing piles in front of the knife on a sheet cake, cut with a slow, sawing motion. Some foam cakes are best not cut but divided by separation. Cut fruitcakes chilled and after a ripening period, preferably of several weeks if they can be baked and stored ahead in chilled storage. It may be desirable at times to cut sheet cakes into smaller portions for small cakes.

### 1515—CAKE FAULTS, CAUSES, AND REMEDIES

Troubleshooting failures on cake baking is made easier by checking through the lists of defects for batter and sponge cakes and ascertaining the causes and remedies for them. See Tables A and B, pps. D15-16 and D15-17, respectively.

### 1513—STORING CAKES

If cakes are stored, see that the storage area is clean and cool and where they will not dry out too rapidly. Cakes can mold easily and time between production and use should be as short as possible.

### 1514—CAKE CUTTING

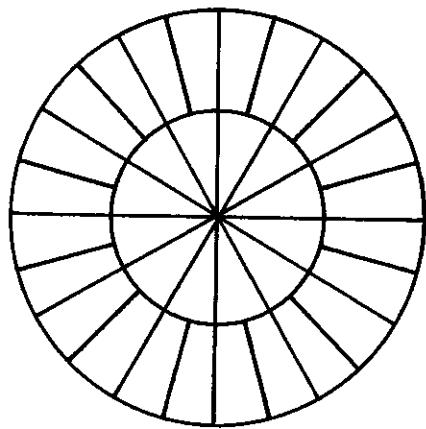
Nearly cut, equal portions will increase the acceptability of the baked cake. The standard sheet pan cuts best into a 6 by 9 slice. (See illustration 9, p. D15-15.)

### 1520—INTRODUCTION TO COOKIES

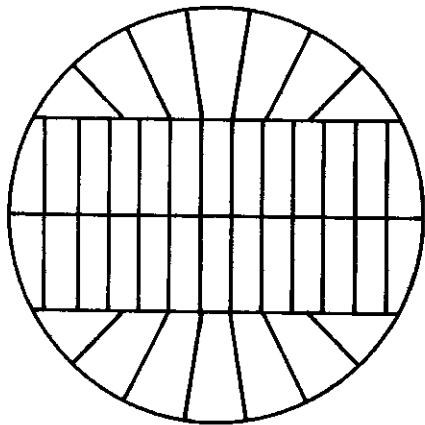
Cookies are often referred to as small, sweet cakes and, if classified by the method of mixing, will fall into two general classifications: batter and foam type. The foam type, which consist of meringues (kisses and shells, coconut macaroons) and sponge cookies (ladyfingers, for example), are not prepared in the Navy general mess. For an assortment of cookies, see illustration 10, p. D15-19.

Cookies are very similar to cakes in the type of ingredients used and the methods used to mix them. They differ from cakes in the proportion of ingredients and panning methods.

### LAYER CAKES

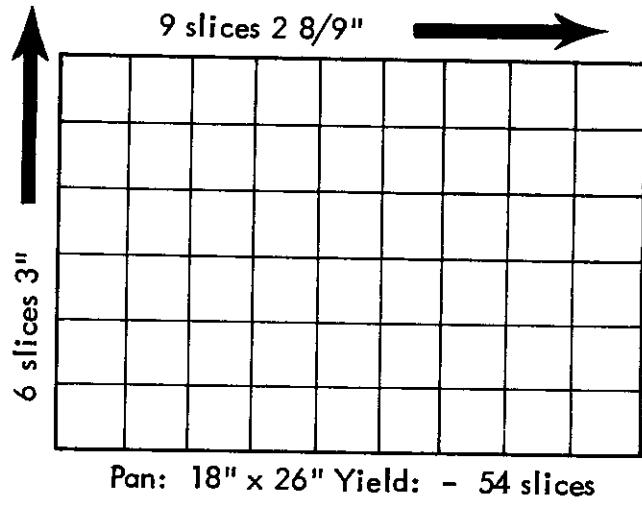


12" -- 2 layer cake  
Yield: 36 servings

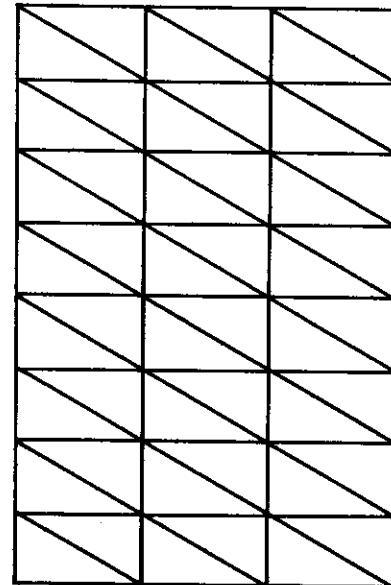


14" -- 2 layer cake  
Yield: 40 servings

### SHEET CAKES



Pan: 18" x 26" Yield: - 54 slices



18" x 26"  
Yield: 48 servings

Illustration 9  
Cutting the Cake

**TABLE A**  
**BATTER CAKES**

Defect	Cause	Remedy
1. Layers uneven.....	1. Batter spread unevenly..... 2. Oven racks out of balance..... 3. Cake tins warped.....	1. Spread batter evenly. 2. Adjust oven racks. 3. Do not use damaged tins.
2. Cakes peak in center.....	1. Insufficient shortening..... 2. Batter too stiff.....	1. Balance formula. 2. Increase moisture and/or decrease flour content.
3. Cakes sag in center, poor symmetry.	3. Too much oven top heat..... 1. Excessive sugar in formula..... 2. Insufficient structure building materials.	3. Check drafts and burners. 1. Balance formula. 2. Increase egg content and/or flour content.
4. Undersized cakes.....	3. Too much leavening..... 4. Cold oven..... 5. Cakes underbaked..... 1. Unbalanced formula..... 2. Oven too hot..... 3. Oven too cool..... 4. Improper mixing..... 5. Cake tins too large for amount of batter.	3. Balance formula. 4. Correct oven temperature. 5. Bake thoroughly. 1. Correct formula balance. 2. Check oven temperature. 3. Check oven temperature. 4. Exercise care in mixing. 5. Use proper amount of batter.
5. Dark crust color.....	1. Oven too hot..... 2. Too much top heat in oven..... 3. Too much sugar, too much milk solids.	1. Use correct baking temperature. 2. Check oven drafts. 3. Balance formula.
6. Light crust color.....	1. Oven too cool..... 2. Unbalanced formula.....	1. Raise oven temperature. 2. Balance formula.
7. Uneven baking.....	1. Oven heat not uniform..... 2. Variation in baking pans.....	1. Check oven drafts, flues, insulation. 2. Use same-type tins for entire batch.
8. Tough cakes.....	1. Insufficient tenderizing..... 2. Flour content too high..... 3. Wrong type flour.....	1. Increase sugar or shortening or both. 2. Balance formula. 3. Use soft wheat flour.
9. Thick, hard crust.....	1. Oven too hot..... 2. Cakes baked too long..... 3. Slab type cake tins not insulated.	1. Reduce oven temperature. 2. Reduce baking time. 3. Use insulation around cake molds.
10. Sticky crust.....	1. Sugar content too high..... 2. Improper mixing.....	1. Balance formula. 2. Use care in mixing.
11. Soggy crust.....	1. Cakes steam during cooling....	1. Remove cakes from tins and allow to cool on rack. Cool cakes before wrapping.
12. Crust cracks.....	1. Oven too hot..... 2. Stiff batter.....	1. Reduce oven temperature. 2. Adjust flour and liquid contents.

**TABLE A**  
**BATTER CAKES—Continued**

Defect	Cause	Remedy
13. Poor flavor.....	1. Inferior materials used..... 2. Poor flavoring material or wrong combination. 3. Materials improperly stored.....	1. Care in selecting materials. 2. Use quality pure flavors. Check flavor combinations. 3. Material storage space should be free from foreign odors.
14. Lack of flavor.....	1. Lack of salt..... 2. Lack of flavoring materials or weak-flavoring materials.	1. Use correct amount of salt. 2. Use sufficient flavoring and correct types.
15. Heavy cakes.....	1. Too much sugar..... 2. Too much shortening..... 3. Liquid content high..... 4. Insufficient leavening..... 5. Too much leavening..... 6. Cakes underbaked.....	1. 2. 3. Balance formula. 4. 5. 6. Bake out correctly.
16. Cakes too light and crumbly.	1. Batter overcreamed..... 2. Leavening content high..... 3. Shortening content too high..... 1. Leavening content high..... 2. Separation of liquids and fats (curdled characteristic in batter).	1. Mix properly. 2. Balance formula. 3. Balance formula. 1. Balance formula. 2. Add liquids at proper temperatures and liquid only as fast as it will emulsify well.
17. Coarse grain.....		
18. Tough-eating cakes.....	1. Formula low in tenderizing materials, sugar and shortening. 2. Oven too hot.....	1. Balance formula. 2. Regulate oven temperature.

**TABLE B**  
**SPONGE-TYPE CAKES**

Defect	Cause	Remedy
1. Undersized cakes.....	1. Overbeating or underbeating egg whites. 2. Overmixing after flour is added. 3. Sugar content is too high..... 4. Oven too hot..... 5. Cakes removed from pans too soon after baking. 6. Cakes underbaked..... 7. Greased pans or tins.....	1. Beat egg whites, sugar, salt, and cream of tartar to a wet peak. 2. Fold in just enough to incorporate. 3. Balance formula. 4. Regulate oven temperature. 5. Allow cakes to cool before removing from tins. 6. Bake thoroughly. 7. Do not grease tins for angel food cakes.

**TABLE B**  
**SPONGE-TYPE CAKES—Continued**

Defect	Cause	Remedy
2. Light crust color.....	1. Cakes underbaked..... 2. Cool oven..... 3. Overbeaten and overmixed batter.	1. Bake correctly. 2. Regulate oven temperature. 3. Mix properly.
3. Dark crust color.....	1. Oven too hot..... 2. Cakes overbaked..... 3. Excessive sugar content causing cake to have sugary crust.	1. Regulate oven temperature. 2. Give proper bake. 3. Balance formula.
4. Tough crust.....	1. Oven too hot..... 2. Sugar content too high..... 3. Improper mixing.....	1. Regulate oven temperature. 2. Balance formula. 3. Exercise care in assembling batter.
5. Thick and hard crust.....	1. Overbaking..... 2. Cold oven.....	1. Lessen baking time. 2. Regulate oven temperature.
6. Strong flavor.....	1. Off-flavored materials.....  2. Poor flavoring materials..... 3. Cakes burned or overbaked.....	1. Check storage space of materials for foreign odors. 2. Use only top-quality flavoring materials. 3. Exercise care in baking.
7. Lack of flavor.....	1. Insufficient salt in formula..... 2. Poor flavor combination..... 3. Poor-quality flavoring materials used.	1. Increase salt content. 2. Use proper flavor blends. 3. Use only top-quality materials.
8. Heavy cakes.....	1. Over or under beaten eggs..... 2. Overmixing after flour has been added..... 3. Too much sugar..... 4. Too high a baking temperature.	1. Beat eggs to wet peak. 2. Fold flour in just enough to incorporate. 3. Balance formula. 4. Regulate oven temperature.
9. Coarse grain.....	1. Cold oven..... 2. Overbeaten whites..... 3. Insufficiently mixed batter.....	1. Regulate oven temperature. 2. Whip to wet peak. 3. Fold until smooth.
10. Tough cakes.....	1. Overmixing ingredients..... 2. Excessive sugar content..... 3. Bakes too hot..... 4. Flour content high or wrong type flour used.	1. Mix properly. 2. Balance formula. 3. Regulate oven temperature. 4. Balance formula; use soft wheat flour.
11. Cakes dry.....	1. Low sugar content..... 2. Overbaking..... 3. Eggs overbeaten..... 4. Flour content too high.....	1. Balance formula. 2. Lessen baking time. 3. Whip to wet peak. 4. Balance formula.

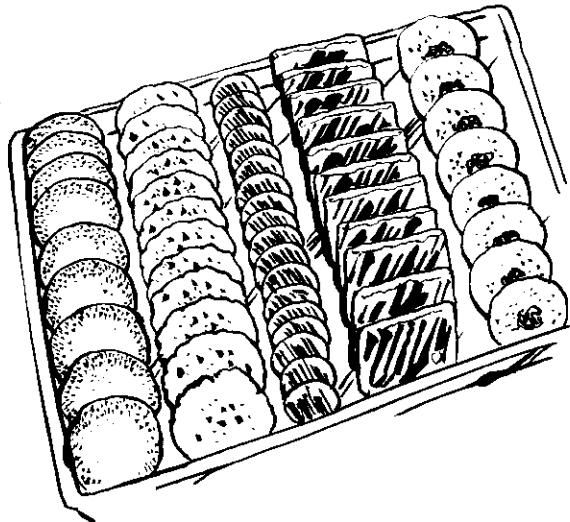


Illustration 10  
An Assortment of Cookies

### 1521—BATTER-TYPE COOKIES

Batter-type cookies are subclassified according to dough consistency as soft, stiff, and very stiff. Batter-type cookies are formulated much like cake except that, generally, there is less liquid (i.e., eggs and milk), and the baked cookies are characterized by soft, hard, or brittle textures.

In cookies, eggs will supply most of the liquid required, so batter or dough stiffness may vary widely. Usually stiff doughs will make crisp cookies and the softer doughs will make moist and soft cookies. Cookies high in sugar spread more than those made from a leaner dough or batter. Recipes requiring sweeteners such as molasses, honey, malt, sirups, or brown sugar should be avoided if a crisp cookie is desired for these tend to draw moisture.

1521-a—SOFT BATTER—Soft-batter cookies have a high moisture content, and because of this require a greater percentage of eggs to give structure. The desired finished product is a soft moist product and must be stored or packaged under conditions which will preserve this char-

acteristic. Cookies included in this category are drop cookies of all sorts and brownies (butterscotch and chocolate).

1521-b—STIFF BATTER—Formulas of stiff batter contain less liquid and eggs and more flour than soft-batter cookies. These cookies are often referred to as cut or rolled cookies. The desirable finished product is crisp. When humidity becomes excessive, the cookies become moist and tend to soften up and lose their desirable crispness. Included in the crisp cookie category are snaps, shortbread, and some bar-type cookies. Shortbread cookies are similar to the snaps except that they have larger amounts of shortening, giving them a rich, mealy texture. Butter often is used in the formula to give its characteristic flavor to these products.

1521-c—VERY STIFF BATTER—Icebox cookies are mixed in the same manner as other batter-type cookies, except the dough is very stiff. The resulting cookie is very brittle. After the mixing is completed, the dough is taken to the bench and weighed off into pieces of convenient size. The dough is then formed into rolls, (which are later sliced into slices of required size), wrapped in wax paper, and put into the refrigerator until time to use. The advantage of this type cookie is that it can be made and stored in the refrigerator until needed, thus eliminating waste and providing a ready source of dessert at short notice.

### 1522—MIXING METHODS FOR COOKIES

Cookies made from batters or doughs are mixed in much the same manner as battercakes. Temperature of ingredients should be around 70° F; the dough is sometimes chilled later to facilitate shaping.

Cookie doughs should be mixed just enough to incorporate the ingredients thoroughly. Overmixing develops the gluten in the dough, thereby retarding the spread. When the mix is

creamed a great deal, the cookies will not spread as much because of the dissolving of the sugar crystals. Improper mixing of ingredients will produce cookies that are spotted.

**1522-a—ONE STAGE**—When mixing by the one-stage method the longer the mixing period the less spread the cookie will have. In any style of mixing, if a portion of sugar is held back and added at the end of the mixing period the larger sugar crystals will tend to promote greater spread.

**1522-b—CONVENTIONAL OR CREAMING**—This method is the most commonly used one for cookies. The longer the creaming of the shortening and sugar, the less spread the final product will have because the sugar will be more finely distributed throughout the mix. The longer the mixing after incorporating flour and water, the more developed the structure of the mix will become and less spread will result. Undercreaming will give the cookies a coarse structure and will result in a baked product which has spread.

In making light drop cookies, it is desirable to cream the sugar, shortening, and eggs to a light consistency in order to produce a cookie with a good volume, texture, and grain. If lumps of sugar are left in the dough during mixing, sticking is apt to occur due to the syrup, which is formed during the baking, becoming hard and solidifying on the pans.

**1522-c—BLENDING**—This method is occasionally used for shortbread cookies to give a shorter and more mealy product.

### **1523—MAKEUP AND PANNING OF COOKIES**

A number of methods are used to make up and pan cookies.

**1523-a—SOFT BATTER**—Cookie batter to be used for drop cookies should be at room temperature for uniform spacing on pans. The batter can be dropped by several means. Use of a spoon is the most commonly used, or drop from pastry bags with tubes. Ice cream scoops may also be used if proper sizes are available. Most drop-cookie recipes specify 1 oz of batter per cookie.

No. 30 ice cream scoop = 1 oz batter

No. 24 ice cream scoop = 2 oz batter

Cookies should be deposited about 2 in apart on the cookie sheet. A pastry tube may be used to deposit cookies if desired.

Soft batter used for brownies or similar cookies are panned exactly like cake batter, and scaling weights should be precise for uniform baking and subsequent cutting after a cooling period.

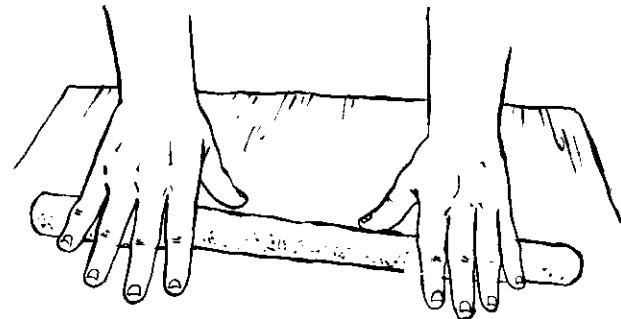
**1523-b—STIFF BATTER**—Rapid cutting and panning of cookies made from stiff batter can occur if a stiff dough is made into a long roll about 1 to 1½" in diameter and then cut with a sharp knife or pastry blade into 1-oz pieces. (See illustration 11, step 1, p. D15-21.) These can then be panned about 2 in apart. A fork can be used to flatten the cookies out, which is frequently done with peanut butter cookies. More rapid flattening can occur with a small can. It is dipped into granulated sugar and then used to press out the cookie. The can is redipped into the sugar and another cut portion flattened to the desired size as shown in illustration 11, step 2.

Activities that have cookie-cutting machines may use them in lieu of the hard-roll method described. Doughs for roll cookies should be soft enough to go through the die for shaping and cutting.

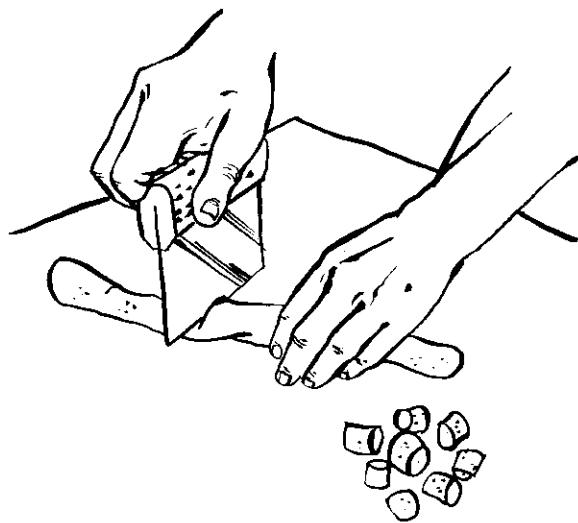
Stiff doughs used for cookies such as bar-type and sheet-type can be divided into approximately 1½-lb pieces, roughly shaped into a strip on a baking sheet the length of the sheet about ¼ in thick and about 3 to 4 in wide. After baking, each bar is cut into pieces diag-

nally. The width of the cut is about  $1\frac{1}{4}$  in wide, or as designated on a recipe. (See illustration 12.)

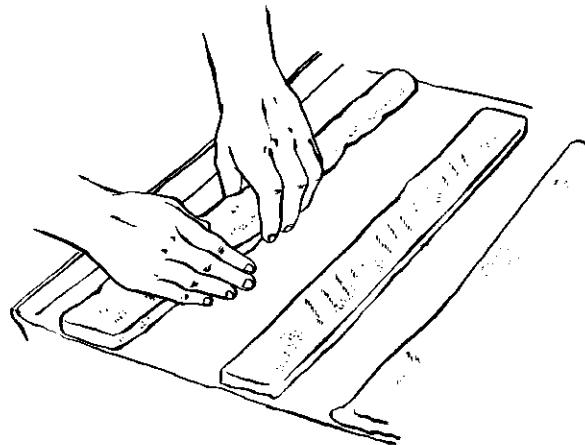
**1523-c—VERY STIFF BATTER**—Thoroughly chilled plain doughs made from very stiff batter may be sliced on a slicing machine. Doughs that contain nuts, fruits, and other products may not slice well in this manner, however, and should be sliced with a sharp knife. When baked, these doughs produce brittle cookies. Ice-box cookies are an example of this.



Forming dough strips for fruit bars.



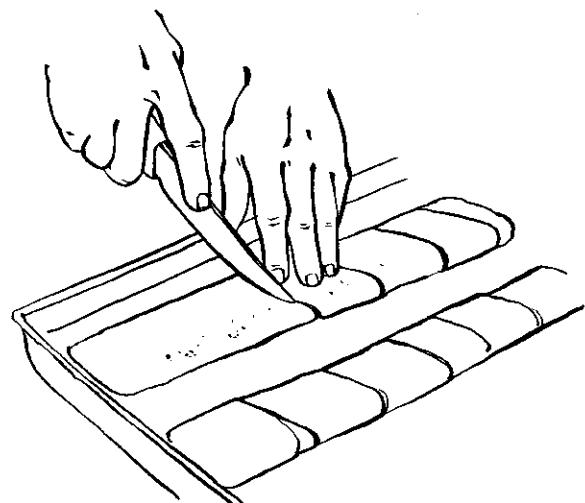
Step 1—Dividing the dough.



Flattening to desired thickness.



Step 2—Flattening the cookies.



Cutting baked fruit bars.

Illustration 11  
Roll Method of Making Cookies

Illustration 12  
Makeup of Bar-Type Cookies

## 1524—PREPARATION OF PANS FOR COOKIES

Cookies high in moisture should be baked on pans which have been greased and floured. For average rich cookie doughs, some greasing is needed. Use pans ungreased for doughs rich in shortening. Careful attention to the condition of the pans before the cookies are dropped on them may eliminate trouble later on with sticking and uneven bake. Cookies may stick to the pan or receive an uneven bake when:

1. Pans are not clean.
2. Pans are wet or have wet spots.
3. Pans are not conditioned properly in oven before being used (applies to new pans only). When new pans are used, it is necessary to follow the instructions given by the manufacturer to condition the pans. As a general rule, the pans should be wiped clean, given a coating of melted fat, and placed in a hot oven (about 425° F) until they acquire a bluish tinge. Then the pans should be wiped again and re-greased, after which they are ready for use.
4. Pans are not thoroughly greased.
5. Pans are uneven on bottom (battered or bent pans).

Pans are greased and dusted in order to retard spread and also to help prevent the forming of razorlike edges which have a tendency to burn or scorch readily.

Pans should be cooled between batches. Warm pans will melt the fat in the cookies, resulting in inferior products. Cookies on pans which are allowed to stand around in a warm or hot location will be adversely affected.

## 1525—BAKING AND COOLING CONDITIONS FOR COOKIES

Proper baking is a most important step in making good cookies. Unless care is taken to bake the cookies at the right temperature, for

the correct length of time, poor flavor, eating qualities, and appearance may result.

A cool oven produces a pale color, while a hot oven may produce too dark a color. Too hot an oven will set a cookie before it has a chance to spread to any extent. Steam has a softening effect upon the cookies in the oven, giving them a greater chance to spread before they become set. Cookies should be on the soft side when taken from the oven, as the dough will bake a trifle during the cooling period. Overbaking dries out the cookie and reduces flavor and taste. Cookies complete the baking process after being taken from the oven since there is heat in the cookie pans.

Cookies high in sugar are susceptible to burning or scorching. Chocolate products burn easily. "Checking" is caused by expansion and contraction of cookies after baking. When cookies come from the oven, the moisture content in different parts of the cookie differs greatly. For example, the center of the cookie would contain a greater percentage of moisture than the outer edges. Cookies should be protected from fast cooling and drafts until the moisture content has an opportunity to equalize.

Protect from fast cooling air currents. Remove cookies from pans while still warm. Cut sheet cookies while they are still warm unless they are to be frosted; in which case, allow to just barely cool, frost, and cut. Use a sharp, thin knife and mark well before cutting so cookies are even in size and neat appearing.

## 1526—STORAGE OF COOKIES

Cookies packed while still warm are apt to soften due to the steam in the package; this also increases the tendency toward rancidity. Cookies should be stored in a cool, dry, well-ventilated room. Baking ingredients absorb foreign odors very readily, so storage conditions should be closely checked.

## 1527—COOKIE DEFECTS AND CAUSES

Defects in the finished cookies and the cause therefor are as follows:

Defects	Causes
Lack of spread.....	Too fine a granulation of sugar. Adding all sugar at one time. Excessive mixing, causing toughening of the flour structure or breaking down of sugar crystals or combination of both. Too acid a dough condition. Too hot an oven.
Excess spread.....	Excessive sugar. Too soft a batter consistency. Excessive pan grease. Too low an oven temperature. Excessive or improper type shortening. Too alkaline a batter.
Fall during baking.....	Excess leavening. Too soft a batter. Weak flour. Improper size. Insufficient shortening. Overdeveloped batter.
Tough cookies.....	Flour too strong. Too soft flour. Excessive egg content. Too slack a batter. Unclean pans. Sugar spots in dough.
Sticks to pans.....	Improper metal used in pan construction. Excess bicarbonate of soda. Excess ammonia. Overbaking.
Greenish cast or dull dark color.....	Too alkaline a dough.
Black spots and harsh crumb.....	Overbaking.
Loss of flavor.....	Cooling too quickly. Lack of moisture retainers to cause more even distribution of moisture during and after baking.
Checking.....	Improper storage.