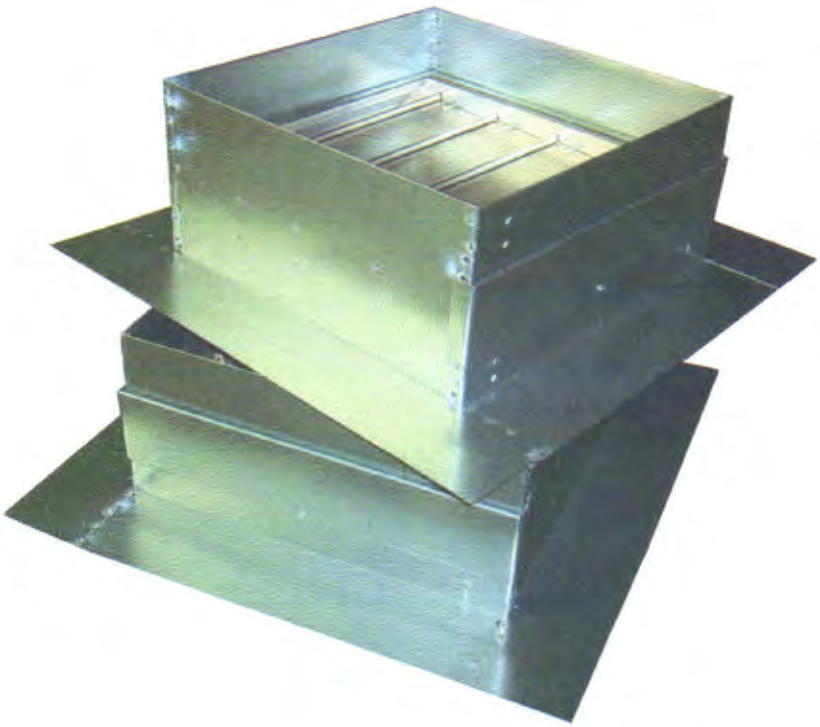
Guide Book

Sheet Metal Duct Work

For Heating & Cooling Systems



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INTRODUCTION

This Sheet Metal Guidebook for Evaporative Coolers and Air Conditioners has been prepared especially for home owners, and Contractors to assist them in ordering sheet metal components and stands for cooling and heating systems.

The first section of the guidebook shows some heating and cooling systems and the components that typically go with them. The booklet deals with both roof mounted and side mounted evaporative coolers, roof mounted heat pumps and air conditioners, as well as coolers used in combination with air conditioners, gas furnaces, or heat pumps.

Following that, the guidebook goes into some detail regarding roof jacks, adaptors, sleeves, drops, stands, and dampers- the most essential components of a typical heating and cooling system.

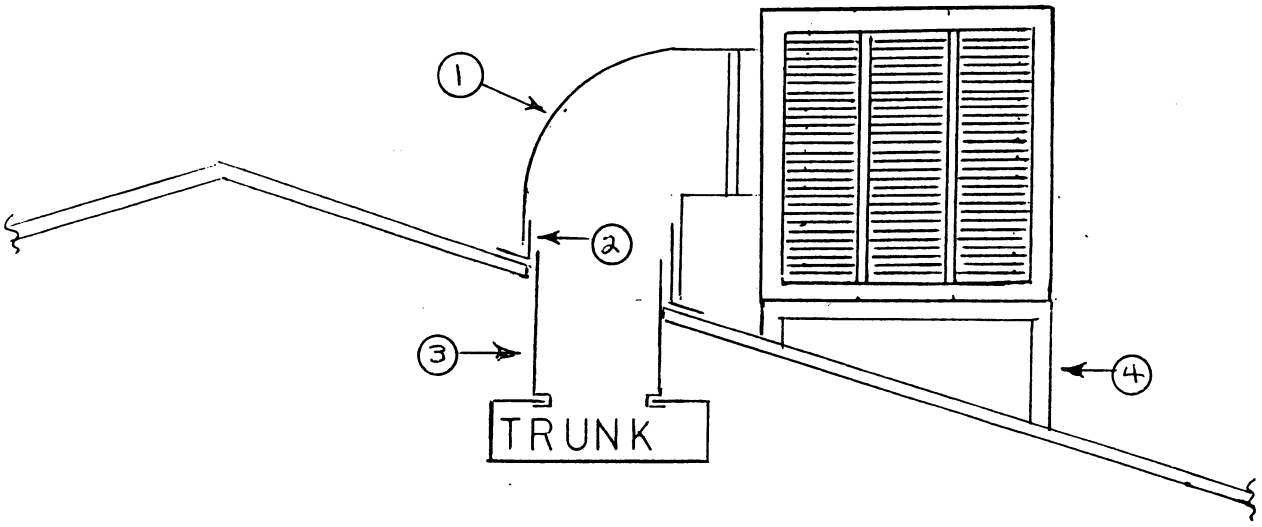
Several pages at the end of the guidebook deal with measurement of components and roof pitch.

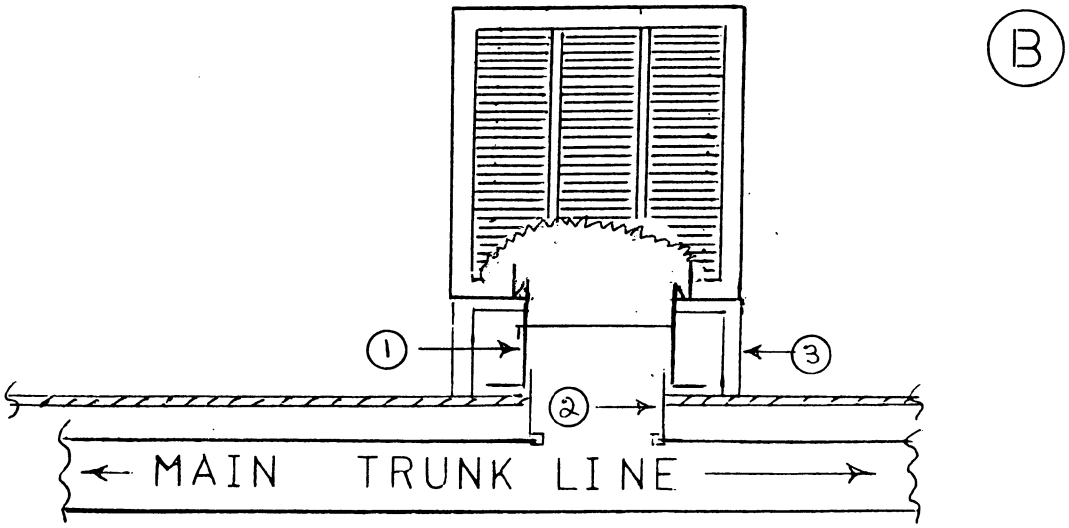
While this booklet only covers a small portion of the types of sheet metal fittings that are often required for residential heating and cooling systems, we hope that it will be of some help to those who would like to know a more about the sheet metal components of their heating and cooling system.

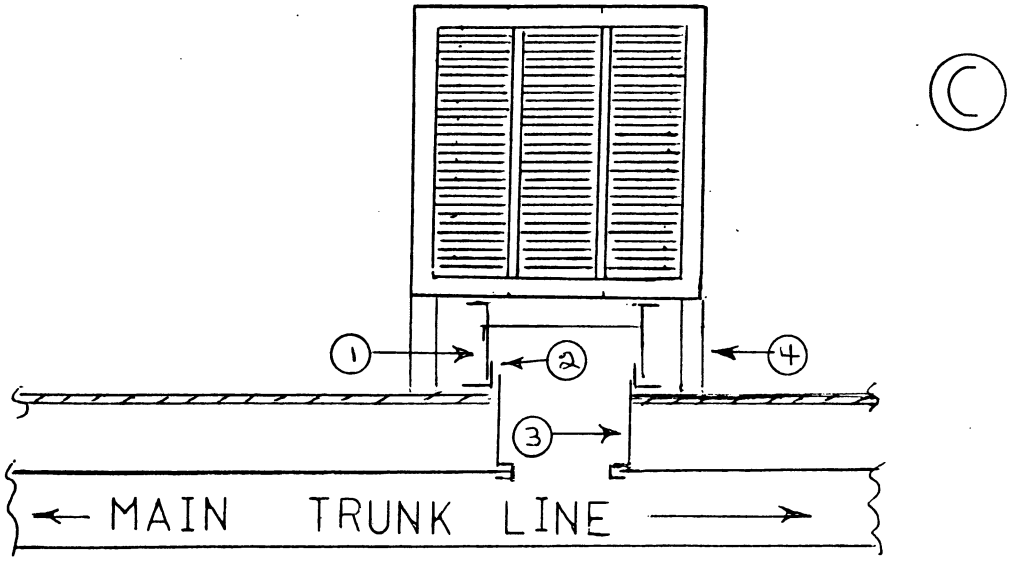
TYPICAL ROOF TOP INSTALLATIONS FOR EVAPORATIVE COOLERS

DESCRIPTION	DIMENSION 4000-4800 CFM EVAP. COOLER	DIMENSIONS 5000-6800 CFM EVAP. COOLER
A) SIDE DRAFT COOLER ON PITCHED ROOF		
1) ELBOW WITH DAMPER	18 X 18	20 X 20
2) SIMPLE ROOF JACK (2/12 PITCH)	17 1/2" SQUARE	19 1/2" SQUARE
3) COOLER DROP (RISER)	17 X 17	19 X 19
4) COOLER STAND	VARIES	VARIES
B) DOWN DRAFT COOLER WITH INSERT ROOF JACK		
1) INSERT ROOF JACK WITH DAMPER-	17 1/4" SQUARE	19 1/4" SQUARE
2) COOLER DROP (RISER)	17 X 17	19 X 19
3) COOLER STAND	VARIES	VARIES
C) DOWN DRAFT COOLER WITH SIMPLE ROOF JACK AND ADAPTOR		
1) ADAPTOR WITH DAMPER	18 X 18	20 X 20
2) SIMPLE ROOF JACK - FLAT	17 1/2" SQUARE	19 1/2" SQUARE
3) COOLER DROP (RISER)	17 X 17	19 X 19
4) COOLER STAND	VARIES	VARIES

Note: The dimensions shown above for insert roof jacks are for the throat. Add 1/2" to these dimensions for the compressions flange at the top of the jack. In other words an insert roof jack for a 4500 CFM cooler is 17 1/4" square at the bottom and 17 3/4" square at the top where it slides into the cooler opening..


A
1
2
3
4
TRUNK


B
1
2
3
MAIN TRUNK LINE

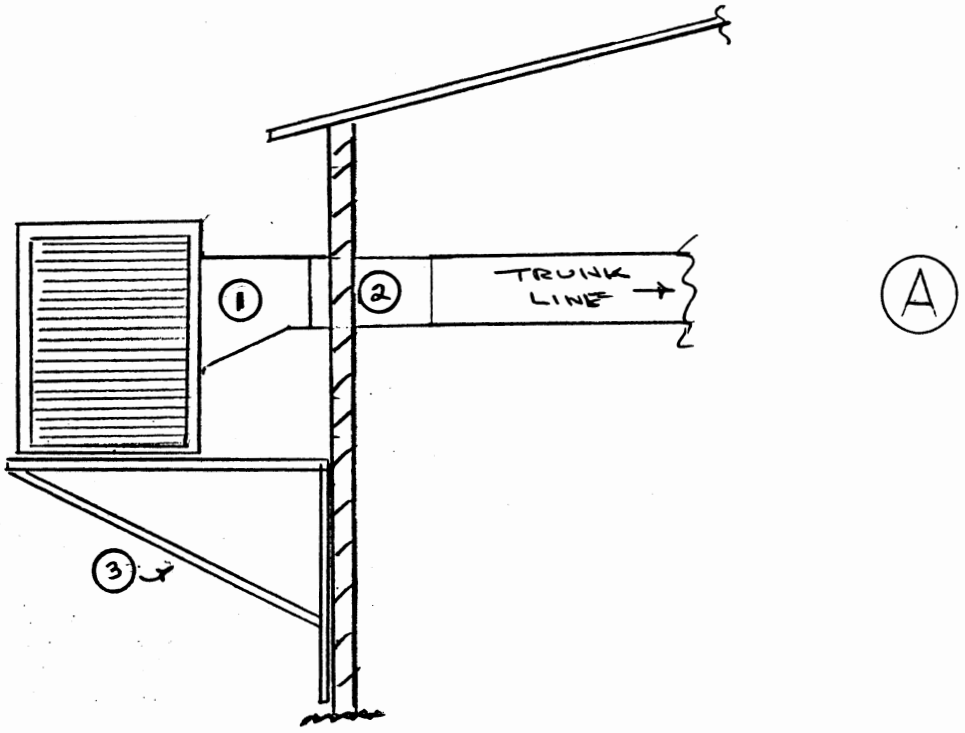

C
1
2
3
4
MAIN TRUNK LINE

TYPICAL SIDE OR GROUND MOUNTED INSTALLATIONS FOR EVAPORTIVE COOLERS

DESCRIPTION	DIMENSIONS 4000-4800 CFM EVAP. COOLER	DIMENSIONS 5000-6800 CFM EVAP. COOLER
A) SIDE MOUNTED STRAIGHT THRU WALL		
1) TRANSITION SLEEVE WITH DAMPER	18 X 18 TO ? X ?	20 X 20 TO ? X ?
2) INTERIOR SLEEVE	As Required	As Required
3) COOLER STAND	As Required	As Required
B) GROUND MOUNTED THRU WALL (TWO OPTIONS)		
1) ELBOW WITH DAMPER	18 X 18	20 X 20
1A) ELBOW WITHOUT DAMPER	As Required	As Required
2) STRAIGHT DUCT	As Required	As Required
3) COOLER SLEEVE WITH DAMPER	18 X 18	20 X 20
4) COOLER STAND	As Required	As Required

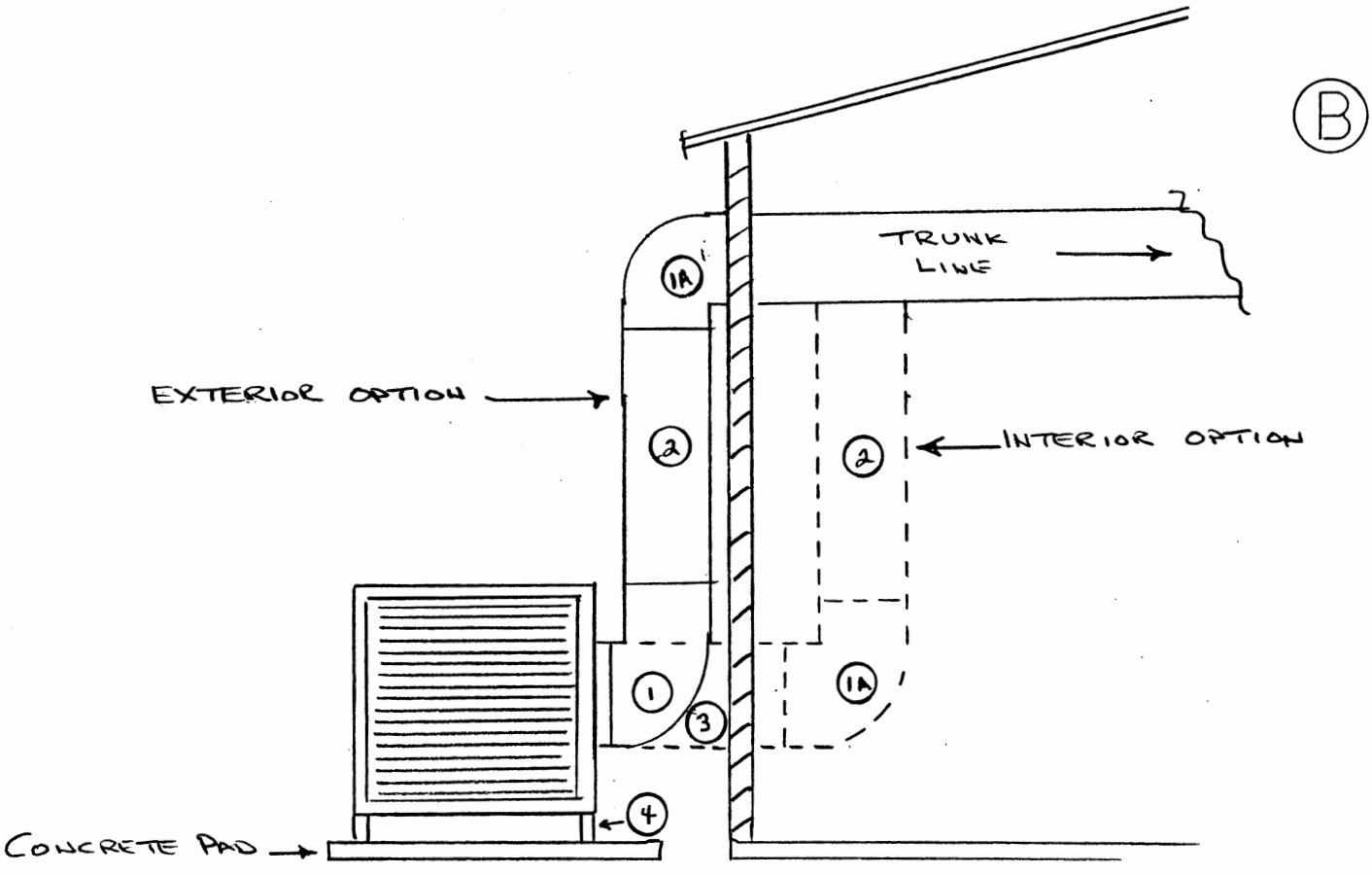
Notes: A) All exterior wall penetrations will require sheet metal flashing around the opening in the wall to prevent water, insects, and rodents from coming into the house.

B) The ground mounted option, which goes straight thru the wall and then upward to the main trunk line, is typical of many new subdivision homes which have air conditioning systems as the primary cooling method. Many builders also provided a concrete slab and wall sleeve for installation of an evaporative cooler at a later date by the owner of the home, if desired. The wall sleeve is usuall covered with a sheet metal end cap on the exterior of the house just above the cooler slab. Electric boxes and water stubs are usually also provided. Simply remove the end cap from the wall sleeve and install a new cooler sleeve which will fasten to the cooler opening at one end, and the wall sleeve at the other end. You should use an adjustable stand to position the cooler so that the cooler opening lines up with the wall opening.


TRUNK LINE
1
2
3

A

B


TRUNK LINE
1A
EXTERIOR OPTION
2
INTERIOR OPTION
2
1
1A
3
4
CONCRETE PAD

TYPICAL INSTALLATION
COMBINING ROOF MOUNTED EVAPORATIVE COOLER AND AIR CONDITIONER
WITH GAS FURNACE INSIDE THE HOUSE

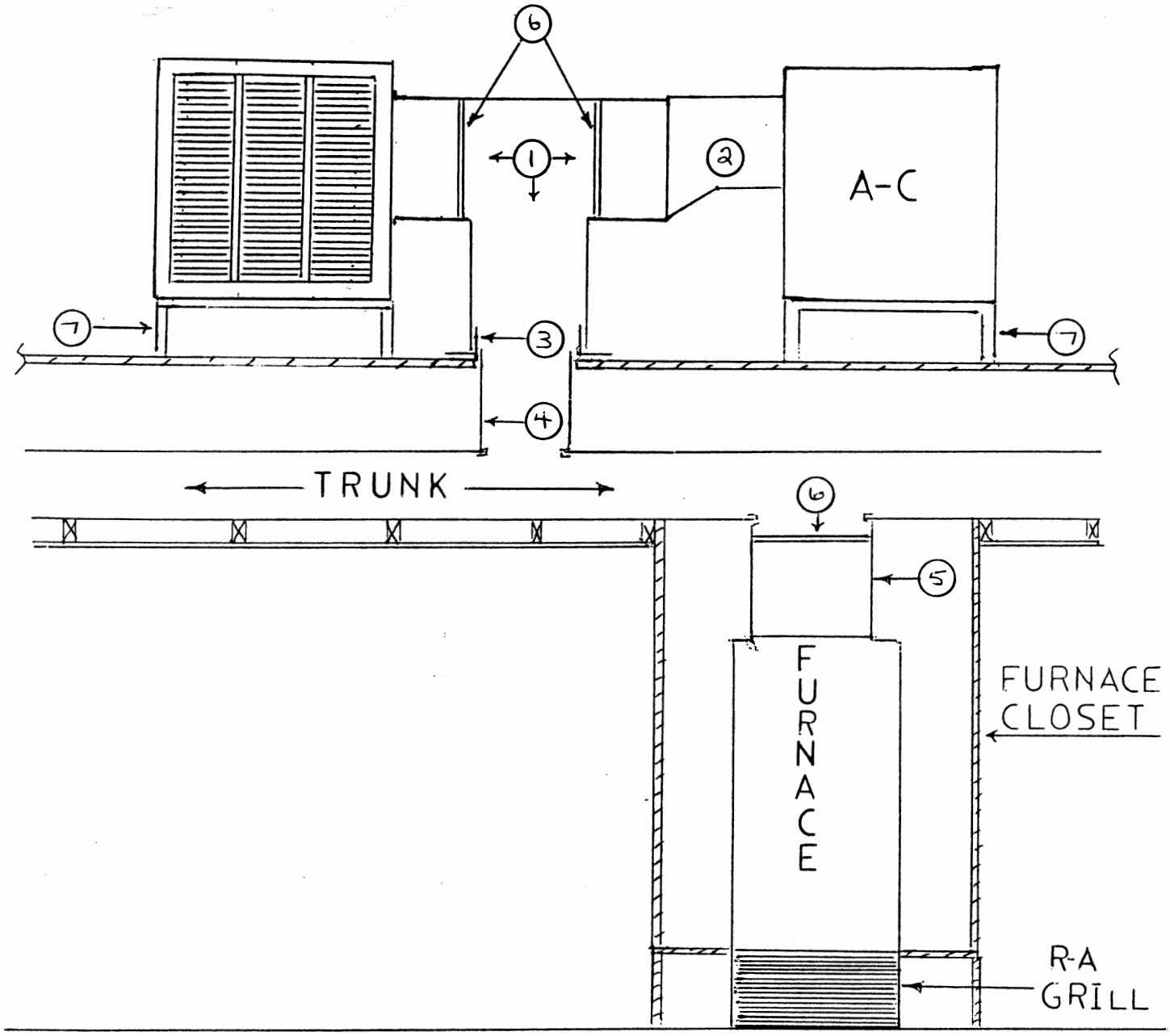
DESCRIPTION	DIMENSIONS 4000-4800 CFM EVAP. COOLER	DIMENSIONS 5000-6800 CFM EVAP. COOLER
1) STRAIGHT "TEE" WITH TWO DAMPERS	18 X 18	20 X 20
2) TRANSITION TO A/C OPENING	As Required	As Required
3) ROOF JACK	17 1/2" Square	19 1/2" Square
4) DROP (OR RISER)	17 X 17	19 X 19
5) FURNACE PLENUM WITH DAMPER	As Required	As Required
6) DAMPERS (MANUAL OR BAROMETRIC)	As Required	As Required
7) EQUIPMENT STANDS (COOLER & A/C)	As Required	As Required

Notes: A) The straight "Tee" can be replaced by a double elbow for better air flow.

B) The return air system for the Air Conditioner is not shown here. It would be behind the supply air duct and not visible from this view. A typical return air system would consist of an elbow from the unit down to the roof, a roof jack slipping up into the bottom of the elbow, a sheet metal duct (drop) from the roof down to the ceiling below, and a return air filter frame, or return air register which would be mounted in the ceiling.

C) A Heat Pump could be substituted for the Air Conditioner shown on the facing page, in which case it would not be necessary to have a gas heater inside the house. The ductwork for the Heat Pump would be similar to the ductwork for the Air Conditioner.

D) A "split system" air conditioner would have coils mounted inside the furnace plenum with a compressor outside the house. The only equipment on the roof would be an Evaporative Cooler (probably down draft) with a roof jack and cooler drop.


6
1
2
A-C
7
3
7
4
TRUNK
6
5
FURNACE
FURNACE
CLOSET
R-A
GRILL

TYPICAL INSTALLATION
ROOF MOUNTED AIR CONDITIONERS OR HEAT PUMPS

DESCRIPTION:

SUPPLY AIR SYSTEM:

1) Supply Air Flexible Connector

2) Supply Air Transition (if needed)

3) Supply Air Elbow

7) Supply Air Roof Jack

RETURN AIR SYSTEM:

1) Return Air Flexible Connector

2) Return Air Transition (if needed)

3) Return Air Elbow

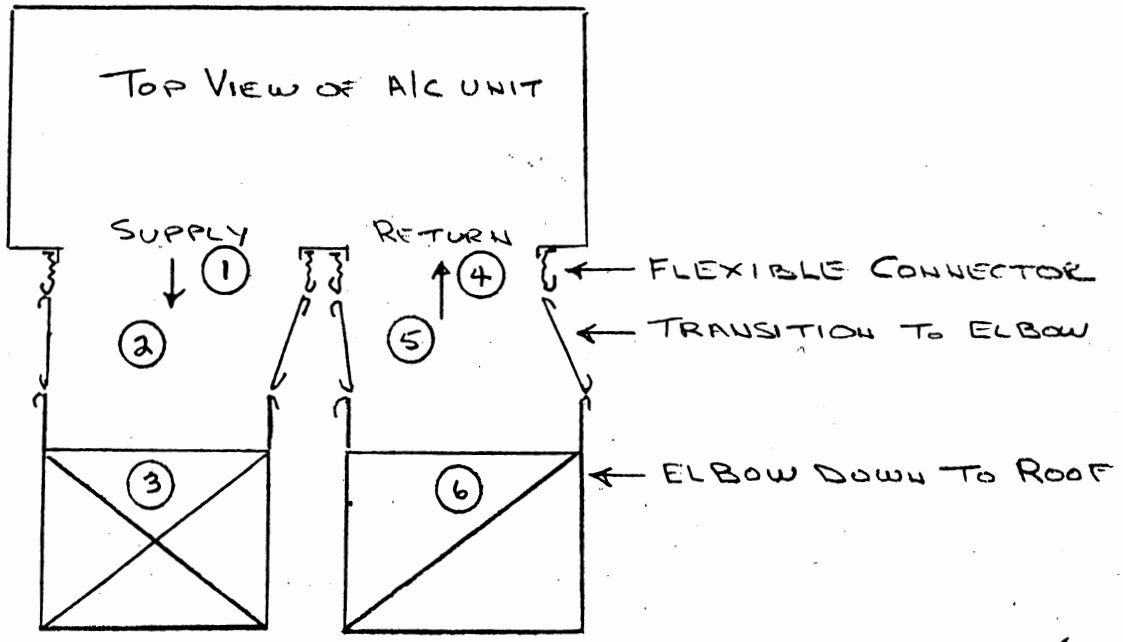
8) Return Air Roof Jack

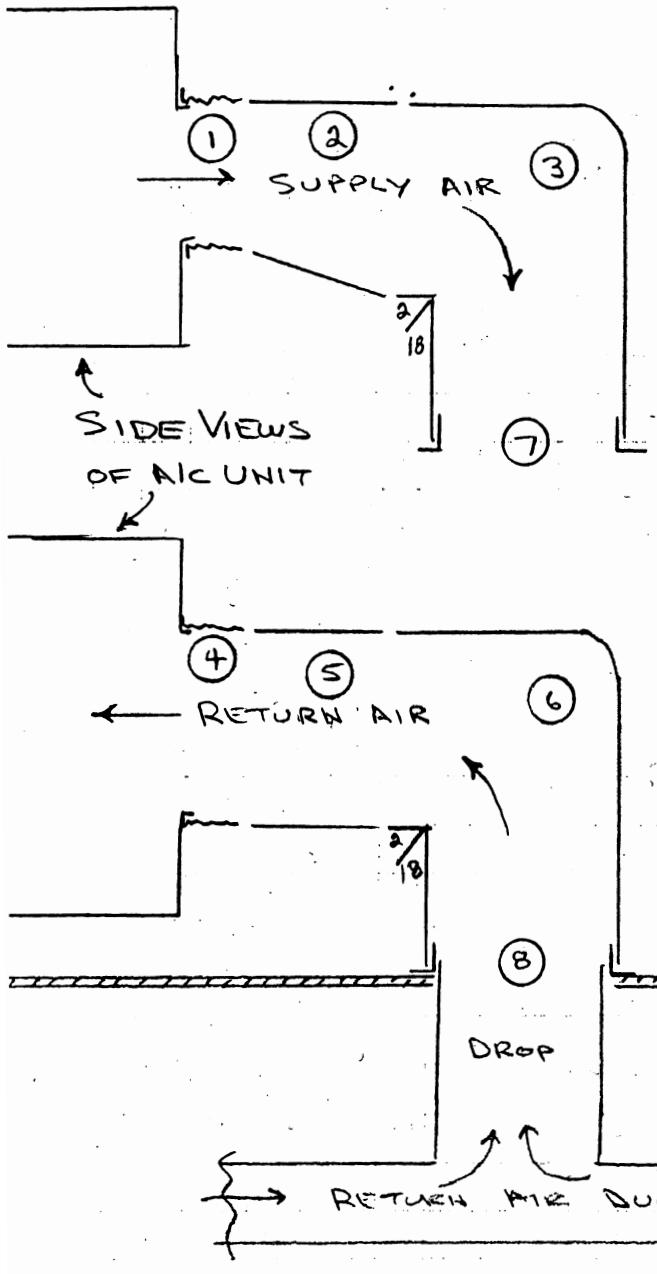
Notes:

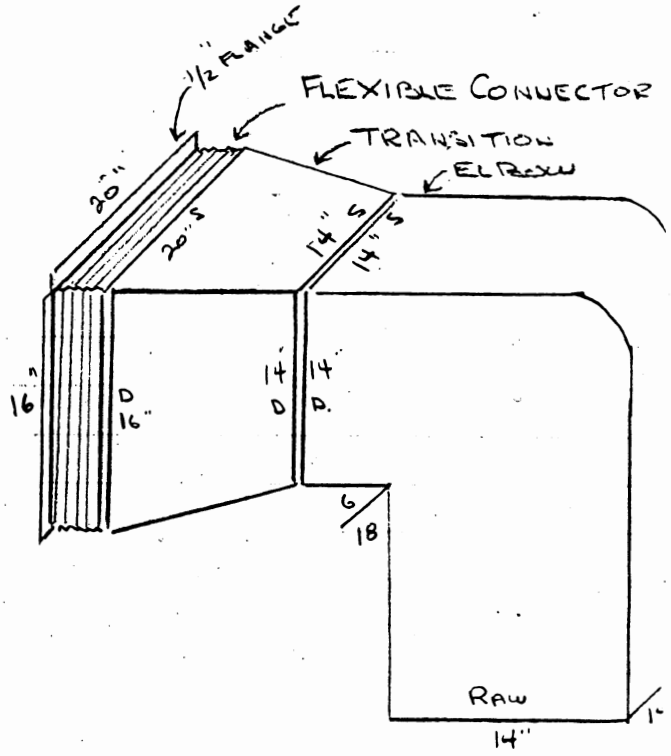
A) Supply and Return Air dimension are often reversed at the outlets of the units. For example the supply air opening may be 20" x 14" and the return air opening may be 14" x 20" . Unless transitions are used, it is necessary to make the elbows for the supply air and the return air different sizes. Transitions may also be necessary to match up with pre-existing elbows and roof jacks if a new unit is being installed to replace an old unit.

B) Some roof mounted units have optional openings underneath the units instead of coming out the sides.

C) Roof mounted units are usually mounted on welded angle iron stands or 4"x4" posts.







SAMPLE OF HOW TO SHOW DIMENSIONS

1 - FLEX CONNECTOR 16"x20"
1/2" FLANGE / D&S

1 - TRANSITION 16"x20" TO 14"x14"
D&S / D&S

1 - ELBOW 14"x14" TO 14"x14"
D&S / RAW

ROOF JACKS

Roof Jacks sit on the top of the roof decking and enclose the opening in the roof where the ductwork penetration is located. The roof jack prevents water from leaking into the house between the outer edge of the ductwork and the opening in the roof. Roof Jacks typically have a 4" base flashing which slides under the shingles or roofing material, and a riser which is 4" or higher extending upward toward , or into, the bottom of the cooler, air conditioner, heat pump, or sheet metal elbow.

The Roof Jack also serves as a short section of duct for conveying the air downward from the cooler unit into the main ductwork.

There are basically three types of roof jacks commonly used for Evaporative Coolers. Drawings of these three types of roof jacks are shown on the facing page, along with descriptions of how they should be used with regard to evaporative cooler applications.

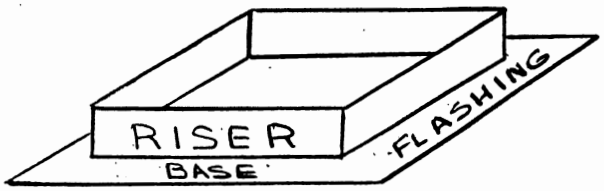
1) SIMPLE ROOF JACK:

2) INSERT ROOF JACK

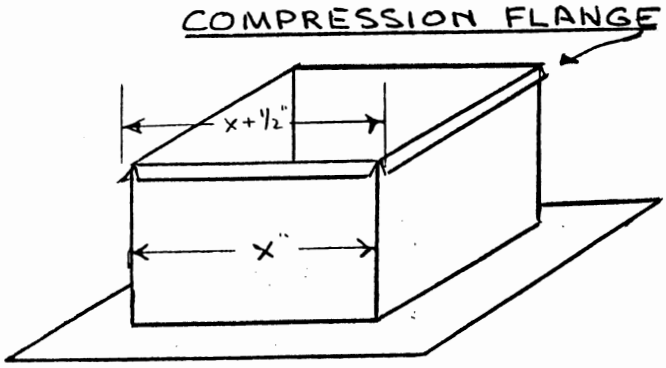
3) FLANGED ROOF JACK (Adjustable as shown on facing page, or non-adjustable which is not shown here)

During the construction of a new house, or the installation of a new roof, the roof jack is nailed down to the plywood roof decking with roofing nails and the roofing material is then applied to lap over the base flashing of the roof jack.

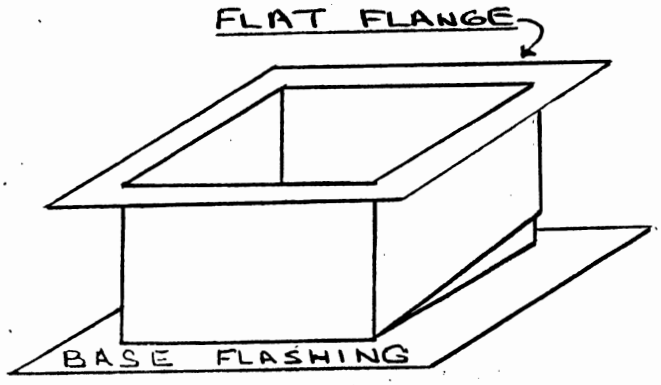
If you are replacing an existing roof jack which has rusted out, or is otherwise damaged, it is necessary to use a utility knife to cut down through the roofing material (outside of the base flashing) to the plywood decking itself. Once the base flashing is exposed, the nails can be pulled out with a claw hammer, or a pry bar, and the old roof jack can be removed. The replacement jack is then set in position and nailed in place. Some contractors trowel a thin layer of plastic roof cement onto the roof deck before nailing the new roof jack in place, in order to seal the bottom of the roof jack. After the new roof jack has been nailed in place, another layer of plastic roof cement is spread over the top of the base flashing and spread out several inches beyond the edges of the flashing onto the roof decking. Most contractors then apply several layers of some type of roofing membrane (asphaltic or synthetic - available at most hardware stores in rolls) and then a final coating of roof cement over the membrane to prevent potential water leakage.



SIMPLE ROOF JACK
USED IN COMBINATION WITH ELBOWS FOR SIDE DRAFT COOLERS, OR ADAPTORS FOR DOWN DRAFT COOLER.
BASE FLASING SLIPS UNDER ROOFING MATERIAL AND PREVENTS WATER LEAKAGE INTO THE HOUSE. RISER SLIPS UP **INSIDE** ELBOW OR ADAPTOR. CAN BE MADE FOR FLAT OR PITCHED ROOFS.



INSERT ROOF JACK
USED FOR DOWN DRAFT METAL COOLERS ONLY. COMPRESSION FLANGE AT TOP SLIDES UP INTO COOLER THROAT AND PROVIDES AIR SEAL. THROAT OF JACK IS 1/2" LESS THAN OUTSIDE DIMENISION OF COMPRESSION FLANGE. CAN BE MADE WITH OR WITHOUT DAMPER, AND FOR FLAT OR PITCHED ROOFS.



ADJUSTABLE ROOF JACK
COOLER RESTS ON TOP OF FLANGE AND IS SEALED WITH CAULK. ADJUSTS TO PITCH OF ROOF. SECURED TO PITCH WITH SHEET METAL SCREWS. ACCEPTS MANUAL OR BAROMETRIC DAMPER.

NOTES; ROOF JACKS ARE NOT DESIGNED TO BEAR THE FULL WEIGHT OF THE COOLER. THE COOLER SHOULD BE SUPPORTED BY A COOLER STAND. JACKS SHOULD BE NAILED TO ROOF DECKING AND SEALED WITH ROOFING CEMENT.

ADAPTORS

An adaptor is a sheet metal box, open at both ends, which fits **over** a simple roof jack. The adaptor usually has a flange at the top so that the opening in the down draft evaporative cooler can be seated to it. The flange can be of the compression type so that the top of the adaptor actually slides up into the cooler opening, or it can be a flat flange turned outward so that the bottom of the cooler rests upon the flange.

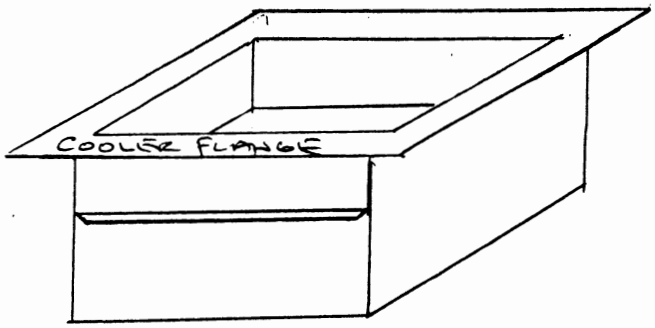
Adaptors serve several purposes. They allow the cooler to be raised and leveled to the exact height desired. They also serve to make a transition from a roof jack which is larger, or smaller, than the opening in the bottom of the cooler. The later type is called a transition adaptor, while the former is called a straight adaptor.

The adaptor fits over the roof jack, instead of sliding into it, so that rain water will not leak into the house during a rain storm. Adaptors can be made with, or without, dampers, and can be built to accomodate either manual or barometric types of dampers.

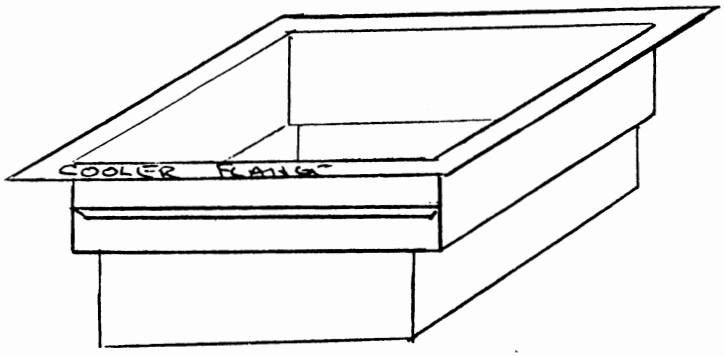
Use of an adaptor also provides the home owner with the ability to change cooler sizes at a later date without having to remove the original roof jack and reseal a new roof jack.

An adaptor can not be used alone without a roof jack because it has no base flashing to prevent roof leakage during rain storms.

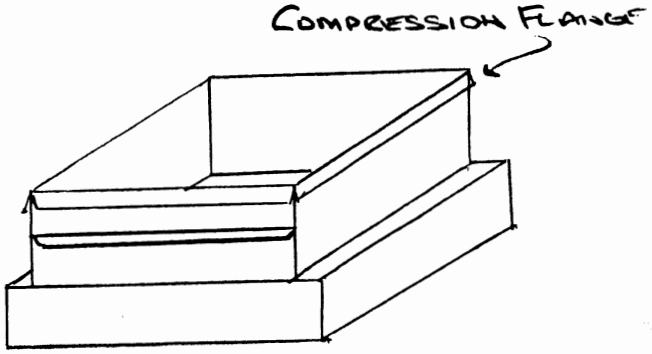
Although not shown on the facing page, it is possible to fabricate a one piece combination roof jack and adaptor which has a base flashing for sealing to the roof and also changes dimension (makes a transition) from top to bottom. Simply visualize a base flashing attached to the bottom of any of the adaptors shown on the facing page.



SIMPLE ADAPTOR-FITS **OVER** SIMPLE ROOF JACK. FASTENS TO ROOF JACK WITH SHEET METAL SCREWS. CAN BE CUT TO MATCH ROOF PITCH. COOLER RESTS UPON CAULKED COOLER FLANGE TO PROVIDE AIR SEAL. CAN BE MADE WITH OR WITHOUT A DAMPER. CAN ALSO BE MADE WITH COMPRESSION FLANGE INSTEAD OF COOLER FLANGE.



TRANSITION ADAPTOR (GROWS)
USED WHEN INSTALLING A COOLER WHICH HAS A LARGER OPENING THAN THE ROOF JACK, OR TO GO FROM A RECTANGULAR ROOF JACK TO A SQUARE COOLER OPENING. CAN BE MADE WITH COOLER FLANGE OR COMPRESSION FLANGE, AND WITH OR WITHOUT DAMPER. CAN BE TRIMMED TO MATCH ROOF PITCH



TRANSITION ADAPTOR (REDUCES)
USED WHEN INSTALLING A COOLER WHICH HAS A SMALLER OPENING THAN THE ROOF JACK. CAN BE MADE WITH COOLER FLANGE OR COMPRESSION FLANGE, AND WITH OR WITHOUT DAMPER. CAN BE TRIMMED TO MATCH ROOF PITCH.

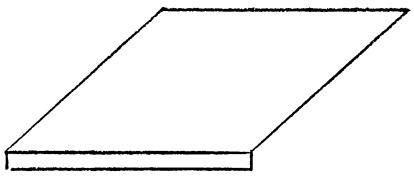
NOTES: IT IS IMPORTANT TO NOTE THAT THESE ADAPTORS CAN ONLY BE USED WITH SIMPLE ROOF JACKS AND WILL NOT WORK WHEN USED WITH A ROOF JACK WHICH ALREADY HAS A DAMPER IN IT, OR HAS A FLANGE AT THE TOP -(UNLESS THE DAMPER AND THE FLANGE ARE FIRST REMOVED FROM THE ROOF JACK). THESE ADAPTORS MUST SLIDE OVER THE SIMPLE ROOF JACK TO PREVENT RAIN LEAKS. THEY ARE FIRST LEVELED AND THEN SECURED IN POSITON WITH SHEET METAL SCREWS INTO THE ROOF JACK. ADAPTORS WITH FLAT COOLER FLANGES ARE SEALED WITH CAULK. ADAPTORS WITH COMPRESSION FLANGES ARE SELF SEALING.

DAMPERS

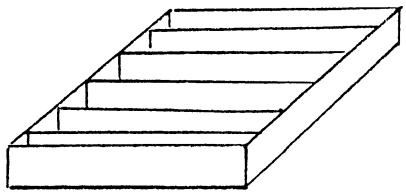
Dampers are devices which are inserted into ductwork at strategic locations in order to prevent the back flow of air from a heater to an air conditioner (or evaporative cooler) and vice versa. They are used when heater and coolers share the same ductwork. When the damper is closed, it prevents air from the heater from going up through the evaporative cooler on the roof during the winter time. This eliminates waste of energy and excessive utility bills. In the summer, the insertion of a damper over the heater prevents damp air from the evaporative cooler from getting into the heater and causing damage by rust and corrosion.

Two types of dampers are in common use today. The simple slide damper (often called a "cookie sheet") is removed or inserted manually with the change of seasons from summer to winter and back again. A barometric damper is a permanent installation which opens and closes automatically as the force of the air moves across the vanes from one direction or the other. The manual damper is less expensive but it does require that you go up on the roof every time you want to remove, or install it. Barometric dampers may be installed in tracks with a cover plate so that they can be removed and cleaned and oiled as required.

Older houses with steeply pitched roofs and large attic spaces sometimes have the cooler damper located in the cooler drop in the attic space instead of in the roof jack on the roof. Also some older houses have a baffle damper that is operated by a chain pull inside the house. Eventually these chains break, or the baffle breaks leaving the owner with no way to control the damper. When this happens the best solution is to install a new roof jack and adaptor with a damper in it and abandon the old baffle type damper completely. If the cooler is a side draft, then a new elbow with a damper would be required.



SLIDE DAMPER



BAROMETRIC DAMPER

STANDS FOR COOLERS AND AIR CONDITIONER UNITS

The Stand is a metal frame, usually fabricated out of sheet metal or angle iron, which is designed to bear the full weight of the evaporative cooler or air conditioner. There are several types of stands in common use today.

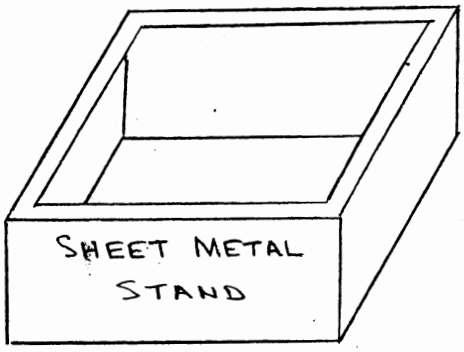
SHEET METAL STAND

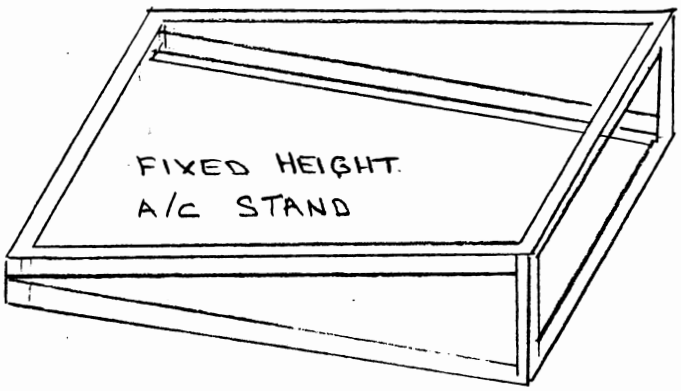
The sheet metal stand is really a box, open at the top and bottom, which encloses the area under the cooler, or A/C. It hides the roof jack, adaptor, and the bottom of the unit from view, and that is its primary advantage. The disadvantages of the sheet metal stand are:

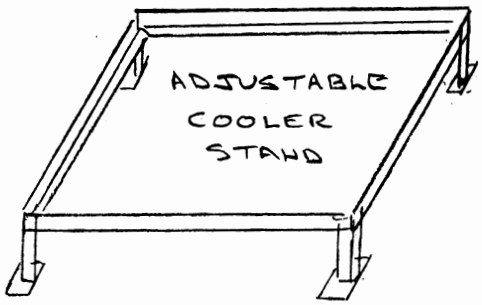
1) It is not adjustable in height
2) Access holes must be provided for removing and inserting the damper in the roof jack, and to gain access to the drain plug in the cooler.
3) The stand tends to retain and trap moisture which can cause roof rot, rusting of the roof jack, adaptor, and cooler drop. Bees, wasps, spiders, and rodents are often drawn to the cool moist environment inside sheet metal stands.
5) Inspection of the bottom of the cooler is virtually impossible - increasing the likelihood that leaks will go undetected until they have caused considerable damage to the roof, roof jack and ductwork inside the house.

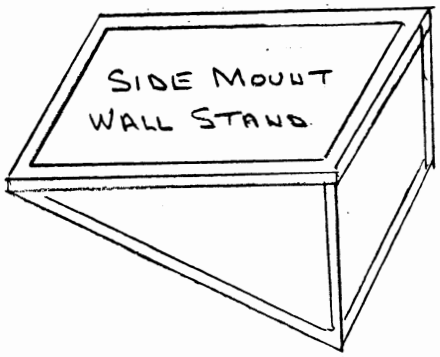
WELDED ANGLE IRON STANDS

Angle iron stands are usually welded out of 1"angle iron for coolers and 1½" angle iron for air conditioning units. The cooler stands can be adjusted in height to meet any slope requirements you may have. Stands for air conditioners are usually fixed in height. Welded angle iron stands allow free circulation of air underneath the unit, which promotes drying and helps to prevent roof rot and rusting of the roof jack. They provide access to dampers and drains, and allow visual inspection of the bottom of the unit.









SLEEVES FOR SIDE DRAFT COOLER
THROUGH -THE- WALL INSTALLATIONS

When Evaporative Coolers are mounted on the side of the house, either on a concrete pad on grade, or on an elevated stand, a sheet metal sleeve is required to conduct the air from the cooler to the opening in the wall. Many new subdivision houses already have a pre-cut wall opening which is lined with a sheet metal sleeve and provided with a temporary cover. However an additional sleeve is still required from the cooler to the wall sleeve. If you are making a new wall opening you will also need a sleeve going through the wall connecting to the ductwork inside of the house. Cooler sleeves and wall sleeves are usually separate for ease of installation and convenience, however in the case of straight sleeves they can sometimes be combined into a one piece sleeve if desired, providing that there is no flange on the house side which would prevent it from sliding through the wall opening.

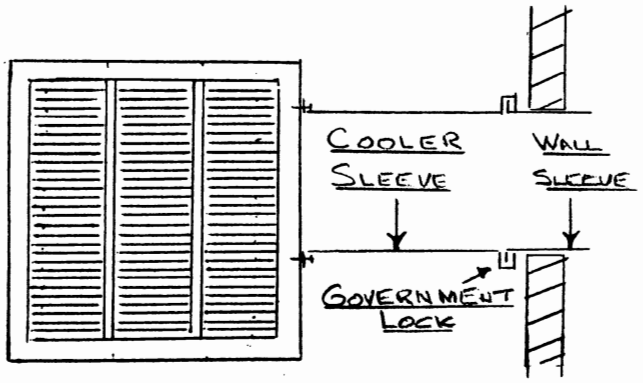
There are basically three types of sleeves:

1) **Straight sleeve** - This is used when the cooler opening and the wall opening are the same size, and when they also line up perfectly.

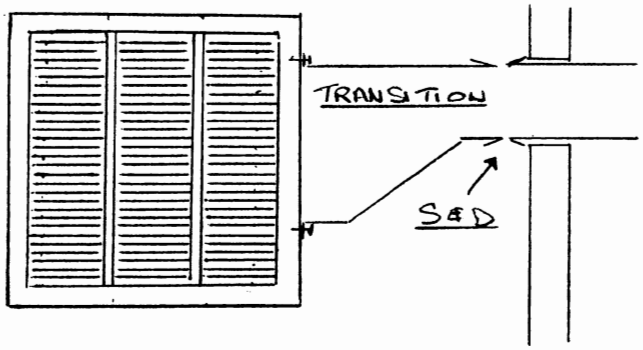
2) **Transition sleeve** - This is used when the cooler opening is a different size than the wall opening. Extreme transitions can reduce the air flow and should be avoided if possible.

3) **Offset sleeve** - This is used when the cooler opening and the wall opening do not line up. The wall opening may be higher or lower than the cooler opening, or it may be offset to the right or the left, depending upon site conditions. In extreme cases it may be necessary to combine a transition with an offset. Extreme offsets can reduce the air flow and should be avoided if possible. A combination of an offset and a transition can cause an even greater restriction of the air flow.

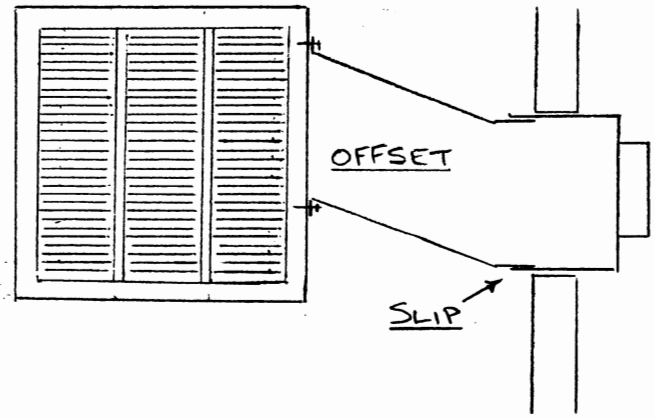
Most sleeves will have a 3/4" flange at the cooler end, so that they can be fastened to the cooler with sheet metal screws and then caulked. At the house end the connection will vary according to site conditions. Common connections at the house are Government Lock, Flat "S" and Drive, slip connection, or a simple 90 degree flange. See separate page for a discussion of these various types of connections. Also, any of these sleeves can terminate in an end cap and a collar if flex duct is being used inside of the house instead of hard sheet metal ductwork. In all cases some type of flashing will be required around the wall sleeve to seal it from the elements and insects.



STRAIGHT SLEEVE
USED WHEN COOLER OPENING AND WALL OPENING ARE THE SAME SIZE AND ARE IN ALIGNMENT. THE SLEEVE IS ATTACHED TO THE COOLER WITH SCREWS AND CAULKED. THE GOVERNMENT LOCK (SHOWN HERE) BENDS OVER EXISTING FLANGE ON WALL SLEEVE. DAMPER LOCATION SHOULD BE SPECIFIED.



TRANSITION SLEEVE
USED WHEN THE COOLER OPENING IS DIFFERENT THAN THE WALL OPENING. THE CONNECTION SHOWN HERE IS FLAT "S" AND DRIVE, BUT IT COULD BE A DIFFERENT TYPE. TRANSITIONS SHOULD INDICATE WHICH SIDES ARE STRAIGHT. DAMPER LOCATION SHOULD BE SPECIFIED.



OFFSET SLEEVE
USED WHEN THE COOLER OPENING AND WALL OPENING ARE NOT IN ALIGNMENT. SPECIFY AMOUNT OF OFFSET AND DAMPER LOCATION. IF TRANSITION IS ALSO REQUIRED, SPECIFY DIMENSION CHANGES. THIS FITTING SHOWS A SLIP CONNECTION TO A WALL SLEEVE WITH AN END CAP AND A COLLAR FOR FLEX DUCT.

CONNECTIONS

There are a number of different types of connections commonly used for low pressure residential ductwork systems. The types of connections listed below and shown on the facing page are the most common in use today but there are many additional types of connections not shown here.

A) CONNECTIONS TO MECHANICAL EQUIPMENT

The most common connection is the 90 degree flange, which is attached to the equipment opening by sheet metal screws and sealed with caulking. Elbows and sleeves for side draft coolers, and plenums for furnaces, all use the 90 degree flange. Down draft coolers use a wide version of the 90 degree flange without screws, but sealed with caulk or roof cement, or they use a compression flange which is inserted into the throat of the cooler opening.

B) CONNECTING SLEEVES FROM MECHANICAL EQUIPMENT TO PRIMARY DUCT LINES

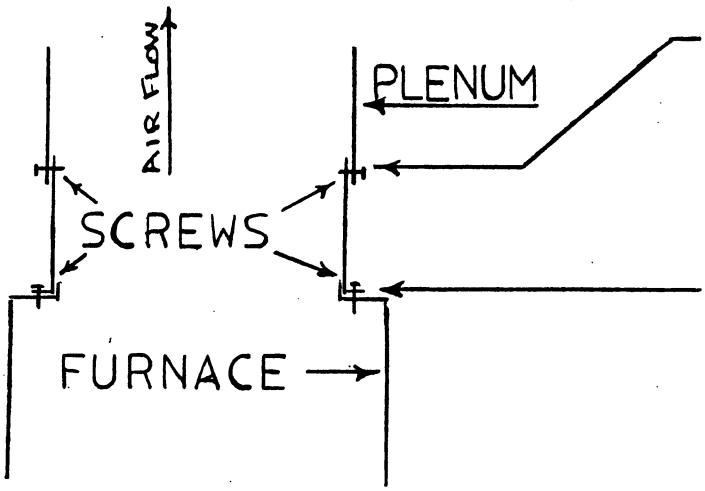
1) Flat "S" and Drive
2) Government Lock
3) Slip Connection
4) Flange to Flange

C) ASSEMBLING INDIVIDUAL PIECES OF DUCT INTO A LONGER STRAIGHT SYSTEM

The most common connection system is the Flat "S" and Drive.

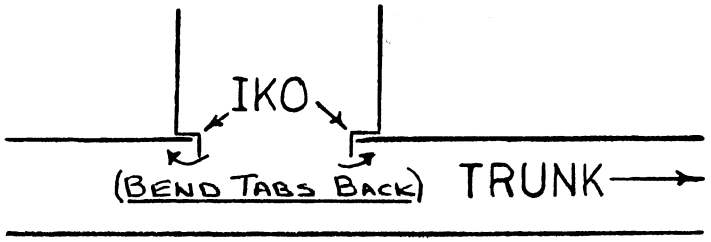
D) BRANCHING OFF THE TRUNK LINE

The most common connection system is the IKO connection

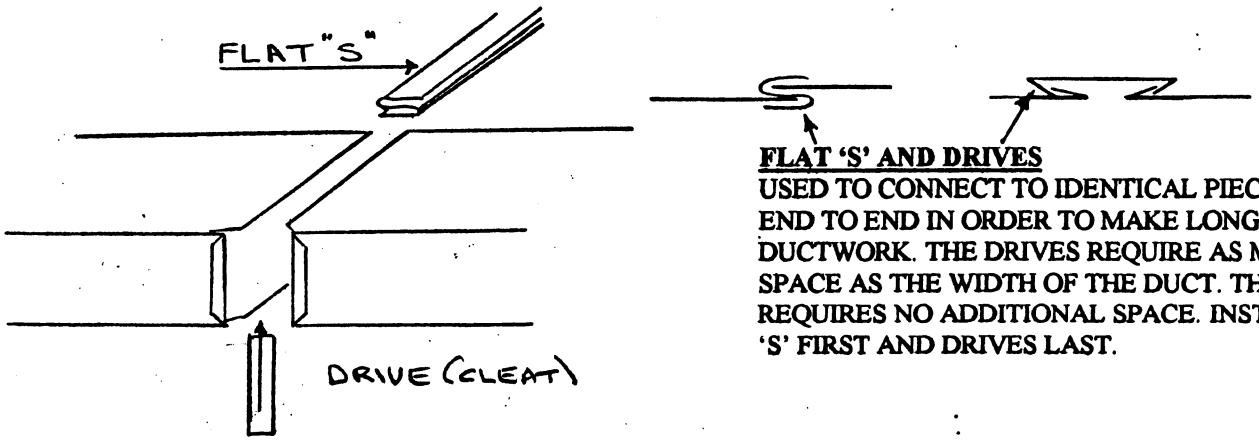


SLIP (TELESCOPE) CONNECTION
COMMONLY USED FOR RETROFITS ON FURNACE PLENUMS OR SIDE MOUNTED EVAPORTIVE COOLERS WHERE THE EXISTING DUCTWORK HAS A RAW END AND THERE IS LITTLE ROOM TO WORK. FASTEN WITH SHEET METAL SCREWS AND DUCT TAPE. TELESCOPE IN DIRECTION OF AIR FLOW.

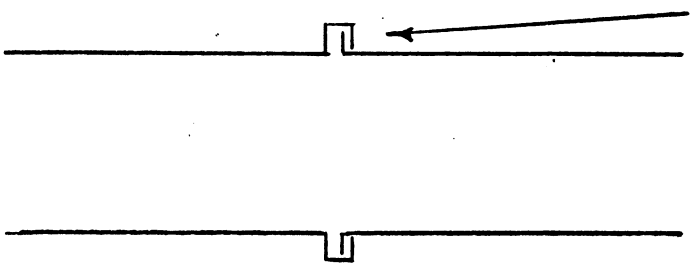
90 DEGREE FLANGE
THESE CONNECTIONS ARE COMMONLY USED WHEN ATTACHING A FITTING TO A PIECE OF EQUIPMENT SUCH AS A COOLER, FURNACE, OR A/C. SHEET METAL SCREWS ARE RUN THROUGH THE FLANGE INTO THE WALL OF THE EQUIPMENT. THEN THE FLANGE IS CAULKED ALL AROUND.



IKO FITTING
COMMONLY USED TO ATTACH DUCTS AT RIGHT ANGLES TO ONE ANOTHER. TO INSTALL, SET THE IKO END AGAINST THE DUCT TO BE PENETRATED. DRAW A LINE ALONG THE INSIDE OF THE IKO ON THE SURFACE TO BE CUT. CUT THE OPENING JUST OUTSIDE OF THE LINE. PRE-NOTCH THE IKO INTO A SERIES OF SMALL TABS. SET THE IKO INTO THE HOLE AND REACH THROUGH TO BEND THE INDIVIDUAL TABS BACK.



FLAT 'S' AND DRIVES
USED TO CONNECT TO IDENTICAL PIECES OF DUCT END TO END IN ORDER TO MAKE LONG RUNS OF DUCTWORK. THE DRIVES REQUIRE AS MUCH WORK SPACE AS THE WIDTH OF THE DUCT. THE FLAT 'S' REQUIRES NO ADDITIONAL SPACE. INSTALL FLAT 'S' FIRST AND DRIVES LAST.



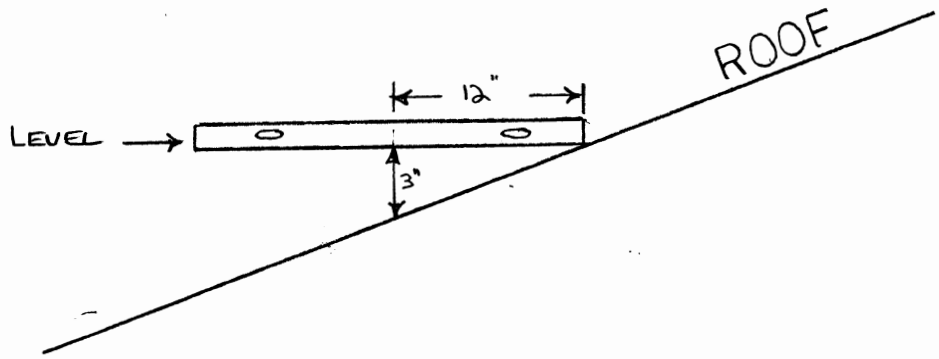
GOVERNMENT LOCK
COMMONLY USED WHEN ATTACHING A NEW PIECE OF DUCT TO AN EXISTING DUCT THAT ALREADY HAS A 90 DEGREE FLANGE. COMMONLY USED FOR COOLER SLEEVES WHERE THE WALL SLEEVE ALREADY HAS A FLANGE. PROVIDES A STRONG MECHANICAL CONNECTION WITHOUT SCREWS.

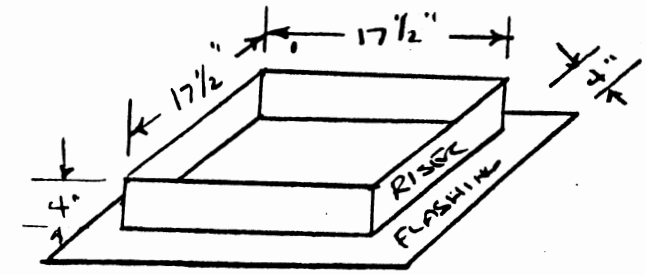
MEASUREMENTS

The facing page shows typical fittings with the dimensions that any sheet metal shop will require in order to fabricate your fittings. When you are ordering sheet metal fittings, sketches with dimensions are the most effective way to communicate your needs to the fabrication shop. The more detailed information you can provide -the better the chance that the shop will be able to provide you with fittings that will meet all of your requirements. Also, sketches will help you to organize your own thinking in terms of exactly how each piece is going to fit into the next.

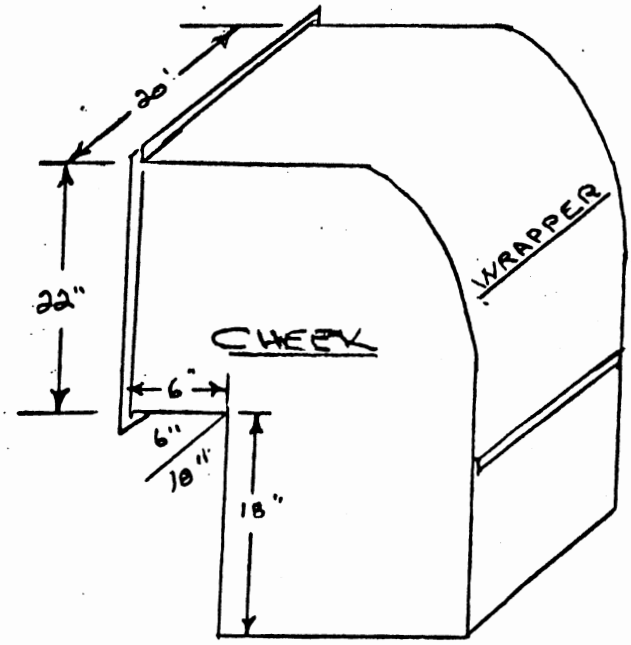
ROOF PITCH

Measuring the roof pitch is important when ordering roof jacks, adaptors, and cooler stands. The simple illustration below shows how to determine the exact roof pitch (slope) with the aid of a level and a steel measuring tape. The drawing below shows the roof dropping off 3" for every 12" of horizontal distance measured along the level. Therefore the roof slope is 3/12. If the roof dropped off 2" in every foot of horizontal distance it would be a 2/12 pitch. **Be sure to measure the amount of drop from the bottom of the level and not the top.**

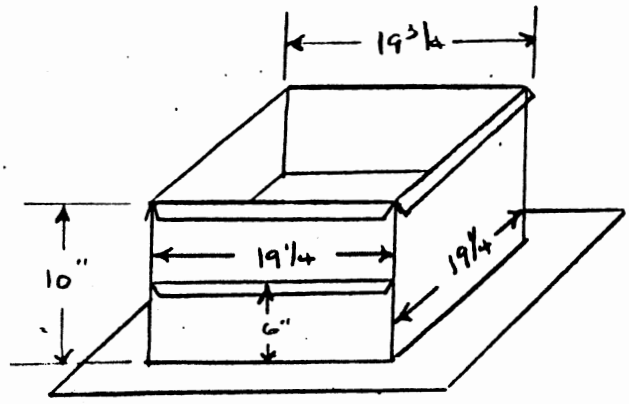




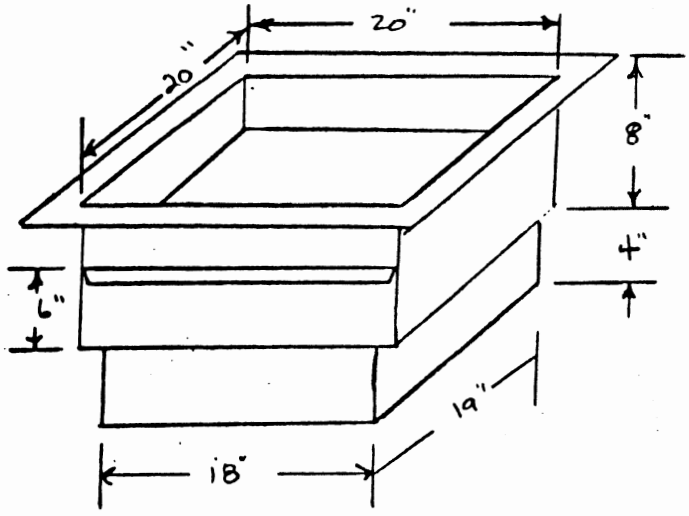
SIMPLE ROOF JACK



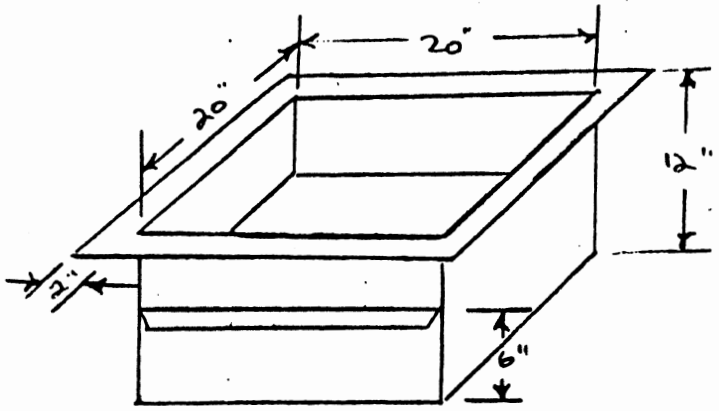
ELBOW



INSERT ROOF JACK



TRANSITION



ADAPTOR