

## La Condesa Private Railroad Car

The La Condesa was built as an AT&SF (Santa Fe) café observation car 1512 in 1926, one of five built that year. In Santa Fe service the car was used in short distance service where a full size dinner car and lounge car was not needed. It was used for runs such as Oakland to Barstow, Denver to La Junta, Colorado and San Diego to Los Angeles.

The interior had a lounge at the platform end with seating for 20 people. Next was a writing desk on one side of the car against the bathroom wall. In the middle of the car was the dining area with 3 tables having seating for 4 people each and 3 tables across from them with seating for 2 people each. Next to the dining area was the pantry and kitchen for food preparation.

In 1959 Santa Fe sold the car to Redfield (Tad) Finlay Jr. who made the car into a Private Varnish by removing the dining pantry & kitchen area and making the area into 3 bedrooms and a small kitchen area. The car was named the La Margarita del Oro and was used as the end car of the Finlay Fun Time Tours train till it was replaced by another car. In 1974 the car was sold to Mr. Gordon Crosthwait and he remained the car "La Condesa". The car was run in charters service until the early 1990's. Mr. Crosthwait was one of the founders of the "American Association of Private Railroad Car Owners" while owning this car. The car was first based in Fresno then later moved to Anaheim. In the early 1990's Mr. Crosthwait started to upgrade the car to meet the new Amtrak Private Car standards in a long slow process. In June of 2006 Mr. Crosthwait donated the car to the "San Luis Obispo Railroad Museum". In February 2007 Mr. Crosthwait passed away knowing that he had found a loving home for his car. The San Luis Obispo Museum will be moving the car to the museum property near the San Luis Obispo railroad station in the future and putting back the Santa Fe interior and finish bringing it up to current Amtrak standards.

For information on the San Luis Obispo Railroad Museum go to [www.slormm.com](http://www.slormm.com).

## History of “La Condesa”

This car was built for the Santa Fe Railroad by the Pullman Company in 1926 as car number 1512, lot #4986, specification # 1040. It was one of five cars built as café-observation cars. It was built with 24 lounge seats and 18 dining room seats using tables that sat two or four. The lounge contained a writing desk and chair as well as a single section which could be made into a lower berth. This was presumably for the steward, where the rest of the crew slept is anybody's guess. Because of this configuration, the car could and did function as a diner, lounge, and in view of the large open platform, as an observation car.

As far as we know the car continued in this configuration for its entire service life. Sometime, possibly around 1940, air conditioning was added to the car. It ran extensively on the Santa Fe train “The Scout” as the only amenity afforded the coach passengers. It was modernized in the late 50's and retired some time in the late 60's. A sister car, in almost the original configuration, still exists today at Campo, CA.

The “La Condesa” and a sister car were purchased by Mr. Tad Finley, possibly around 1966. He made some major renovations to the car. He completely removed the kitchen, pantry and dining room, and installed a permanent partition between the former kitchen and pantry.

He converted the kitchen into a double bedroom by installing a crosswise convertible sofa and a lengthwise upper berth. Also a “combolet” was added. This “combination” unit was apparently removed from a prewar lightweight car and contains a fold out toilet, a fold down sink, and a medicine cabinet. It is complete with its own lighting and shaver outlet. The former icebox in this room was converted into a large closet.

The pantry was also converted into a double bedroom. In this room a lengthwise convertible sofa and an upper berth were installed. A standard railroad “through the floor” toilet was added as was a sink and small closet.

Two thirds of the dining room was converted into another double bedroom. It had a fixed double bed, a “combolet”, and a desk. Since it was the largest bedroom on the car with two large windows, it was used exclusively by the Finley's and was designated “Bedroom F”.

In order to do this and provide a hallway around this bedroom one of the old ice boxes was removed and the passageway placed on one side of the car. Formerly passengers passed through the center of the dining room. The remaining ice box was converted into a shower. The former ice loading hatch for this ice box was covered with glass giving this shower the unique feature of having a skylight!

Mr. Finley added a small kitchen on one side of the remaining one third of the dining room and a “card table”.

The lunge was redone in red flock wallpaper and painted red and gold. A small piano was also added. The writing desk was removed and a wet bar installed in this space.

Also added at this time to the underside of the car were two small generator sets and a fuel tank. the steam activated air conditioning was dismantled and some of it's components were used for the installation of a more modern AC system using Freon refrigerant.

Mr. Finley called the car "La Marguerita De Oro", and used it along with several other cars for his "Finley Fun Time Tours" trips. It was on one of these trips to Mexico in 1968 or 1969 that Gordon Crosswaith first became acquainted with the car. It seems that he was apparently quite enamored with the car and it's features. Mr. Finley sold the car to Gordon in 1969.

Gordon made several improvements to the car. He started by replacing the two small generator sets with two larger units and a larger fuel tank. With Bill Farmer's help modifications to the electrical system were also made to accommodate these generators. Gordon ran the car for several years. The early trips were mostly on the SP top Reno NV, although it was seen occasionally in Bakersfield on the S Fe. This was before Amtrak's requirements forced it's temporary retirement in 1990.

In 1989 work commenced on refurbishing and improving the car. Extensive modifications to the car's electrical, plumbing and heating systems were made during this hiatus. Repairs to the car body and other rusted out areas was also done at this time. A new toilet system was installed along with a holding tank.

## La Condesa Mechanical Systems Summary

I commenced working on La Condesa in April of 1989. The first job that we tackled was to remove and replace as much of the old interior electrical wiring as we could. The location of all of the interior electrical conduits was documented along with all junction boxes and pull boxes. As the new wires were pulled in, we recorded each circuit's function and distribution. Spare wires for future applications were also installed.

The main electrical conduit runs down the center of the ceiling. It runs from the circuit breaker (CB) panel at the Steward's section to the open platform of the car. Due to the installation of the air conditioning, a portion of this conduit had to be rerouted around the air conditioning (AC) unit to the bathroom side of the car and then back to the center of the lounge ceiling.

The old fuse panel was removed and a new CB panel installed. This CB panel is in one of the lower lockers at the Steward's section.

As originally built, this locker contained the main switch panel for all of the car's lighting. It also included switches for the four fans located in the lounge and dining areas before the installation of the air conditioning. See Fig. 1.

We started at the old switch/fuse panel in the lower locker near the Steward's section. Three 1-1/4" conduits run from this panel up to a large junction box near the ceiling. From this box conduits went in several different directions. See Figs. 2 and 2A.

See Figures 3 & 4 for diagrams of some of this wiring distribution as it proceeds from the main junction box towards the OBS end of the car.

Fig. 5 shows the conduits that run to the forward (or old kitchen end) of the car.

Fig. 6 is a continuation of some of that wiring.

Fig. 7 is the conduit layout in the space above the OBS platform ceiling. This area is accessible through a hatch in the platform ceiling.

Fig. 8 is an additional diagram of the lounge/OBS ceiling and wall outlet wiring.

Figs. 9 to 16 are schematic wiring diagrams for all the various circuits contained in the Steward's circuit breaker panel.

Fig. 17 is a layout of the Steward's circuit breaker panel. There are three more circuit breaker panels on the car, in the main electric locker, to be described later.

One of the early projects that we tackled was to rebuild the old water cooler locker. This is the small locker to the left of the general toilet door. See Fig. 18. The upper part of this locker contains the old, but still working, air conditioner controls. Directly below these controls is the 32 volt DC control and meter panel. As could be expected, the entire bottom of this locker was rusted out. While we were at it, we added a 1220 volt duplex outlet to the bathroom.

### Air conditioning

Perhaps a word would be in order regarding the air conditioning system. Mr. Finely tried to retain much of the old steam ejector air conditioning system when he modified the car. The blower fan inside the car still has a 32 volt DC motor. The condenser fan, up in the space above the bathroom and section seat, also has a 32 volt DC motor. The compressor however has a 240 volt AC motor. As you can see, it is a mix of two systems. The AC system, unfortunately, uses

Freon 12, now banned as a refrigerant. The compressor is a Carrier model 5F20. This is a two cylinder unit of about 3 tons capacity. Maximum RPM is 17590 and the drive pulley must rotate clockwise. If this compressor is run in the wrong direction, the oil pump will not work!

In order to make this system work, a 32 volt DC power supply was necessary. Fig. 19 is the schematic diagram of this power supply. Fig. 20 is the 32 volt distribution layout and Fig. 21 is the actual wiring diagram. The 32 volt DC power supply is located under the car in a locker that is beneath the bathroom. The P/N J box indicated in Fig. 21 is a large Pile National junction box that is also under the car and located behind the AC compressor. The two 4 gauge wires, numbers 12 and 13, shown in this diagram run to the bottom of the Steward's locker and were for the train line connector at the forward end of the car. This connection has not been hooked up. There are also two 6 gauge wires, numbers 21 and 22, which run to the 120 volt lighting selector switch. Why this was done I am not sure, but I think that it was to provide 32 volts DC to the lights from another car, via the train line, should both of the car's generators fail.

There is a 120 volt selector switch in the main electric locker on the car. This switch provides power to the 120 volt CB panel, PANEL 3. 120 volt power can be obtained from two sources, the 240 volt to 120 volt transformers or from a 120 volt connector under the car. If 240 volts is not available, then the car can be lighted by using this under-car connection. There is a 32 volt DC position on this switch added for emergency lighting. See Fig. 41.

Fig. 22 is the schematic diagram for the AC control system as drawn by Bill Farmer in 1988. As you can see, it uses the old Steam Ejector panel for the interior fan control and to turn on the condenser fan motor. Through a series of other relays, it will also turn on the compressor motor. Bill Farmer did most of the original wiring on the car. There is a separate folder containing his original drawings. We did a test run of the AC in Sept. 07. It runs, but needs some more Freon. We also checked to insure that the compressor was running in the correct direction.

Fig. 23 shows two photos of the air conditioning condenser unit that is located above the bathroom/section part of the car. It is accessible through a roof hatch. The small copper pipe with the two nozzles on it is the water spray piping. During very hot days a water spray was used to aid in improving the efficiency of the AC system. The valve for this spray system is located near the floor on the left hand side of the kitchen supply locker.

We also did some extensive repairs to the steel in this upper condenser compartment. We added some baffles and repositioned the air filters to prevent rain water from entering the car. Note the old water stains behind the bar. It should also be noted that there are two roof hatches that have to be opened for the condenser unit to operate properly, before using the AC. They need to be motorized. For now there is a wire loop on the roof hatch to secure them in an open position.

In Fig. 24 are two photos of some work that was done on the upper berth in BRM A. We enclosed some exposed sheet metal work and added two doors to the locker above this berth.

The upper berth in this room needs to have the left and right chains that support this berth shortened. The two large spring assemblies that counter balance the weight of this berth were not mounted in the proper location. They are too low and not positioned back far enough. As a result, the weight of this berth and its occupant is supported by the berth ladder and not the chains. The spring assemblies each have a stop that should engage when the berth is in the lowered position. Because of the improper location of the retractable springs, the chain does not fully extend to the stop position. As a result, the berth is held in position by either the curtain support rod assembly or

the berth ladder. If the ladder is in place, the weight of the occupant is borne by the ladder and curtain rod support. If the ladder is removed the entire weight must be supported by the curtain rod assembly, which is not designed for this task. Damage to the rod assembly will occur.

The hot water heater is located under the car in its own compartment. See Fig. 25. It operates from a 240 volt circuit.

One of the jobs that we tackled, and which turned out to be quite a major undertaking, was to replace all of the rotted wood and steel under one of the old ice boxes. This ice box had been removed during Mr. Finley's renovation of the car. Its former location is now part of the hallway around BRM C. Both of the ice boxes that were on the car developed leaks over the years and this constant wetness damaged the supporting wood and steel.

As we got into this project, it just continued to grow. There was more damage than we had suspected. Not only was the flooring rotted but parts of the side sheets were badly rusted as well. We started at the old ice box location and removed all of the damaged material. We eventually ended up with a large hole in the floor. See Fig. 26. The side sheets of the car as well as the bottoms of the pier panels were also in bad shape. See Fig. 27. We even needed to replace a two foot section of the 5" "C" channel under the car. See the folder marked "Mechanical Prints" for more details as to all that was repaired.

As we continued with this project, we realized that the damaged area was much larger than anticipated. The flooring under the Steward's electric cabinet, which was just behind the old ice box, was also compromised. See Fig. 28. The damage extended inboard as far as the door to BRM C. The board shown in Fig. 28 is the new replacement 2 3/4" by 2 3/4" beam to support the flooring. Note the rusted out floor over the center sill and the new replacement steel. (Middle and bottom photos) See the next three pages for more details on the replacement flooring.

The wood floor under the other ice box, now the shower, also needed replacing but we elected to do that later.

The outside wall of the car that was next to the old ice box also needed some repair. See Fig. 29 for some before and after photos.

While we were at it, we removed all of the old steam heating pipes from this hallway. New electric baseboard heating units were installed as were conduits for heating, electrical outlets, and call bells, etc. We started at the kitchen and worked our way toward the front of the car. We will discuss more about the wiring and conduit layout later.

After the ice box area was fixed, we then moved on to the forward hall of the car near the doorway. The flooring at this door, by the old kitchen, was also found to be in bad shape. Fig. 30 shows this hallway renovation near the forward door and the door to BRM A. The 1/2" conduit, shown on the floor, is for the forward door bell. In Fig. 31 are some more photos of this work. Fig. 31A is a floor plan showing the new work.

We noticed, while doing this work that the forward door to the car would not close completely. This was due to rust forcing the door jam outward. This problem was particularly bad on the right side. We replaced the lower half of this door jam with new steel, see Figs. 30, 32, and 32A.

The upper photo in Fig. 33 shows the new plywood floor that was installed in front of the door to BRM C. It also shows the new steel skirt installed at the bottom of the shower. The bottom

left photo shows the new electrical conduits brought into the lower compartment of the Steward's electric locker and the new 5" box. Note the large 2" main conduit. The bottom two photos also show the plywood added, by Mr. Finley, to reduce the size of the old dining room passageway and create a new doorway for BRM C. Note the old original curved partition.

After we finished the interior wall at the old ice box, see Fig. 29, we proceeded up into the ceiling to repair the old ice loading chute.

See Fig. 34. The old ice chute is clearly seen in the top photo. The newly repaired side wall can be seen to the left. After painting and adding insulation, the ceiling was enclosed. See lower photo.

At one point in time we proceeded to patch all of the holes in the steel floor of the car. This is the 1/8" thick steel sheet that can be seen from under the car. It is mounted above the center sill, the C channel, the outer C Channel and the cross bearers. It covers the entire floor of the car from one end to the other and supports the wood floor. While we were at it, we extended the toilet and sink drains for BRM C. Fig. 35 shows some of this work as well as some of the new electrical conduits that were also added. See Fig. 36 for a rough layout of these conduits. One 1/2" conduit was brought up, into the car, and into the lower compartment of the Steward's electrical locker. More information on the under car conduits will be provided later.

Fig.37 shows some of the electrical conduits added during the floor renovation. Note the pier panel repairs. This was necessary because the bottom 4" of several of the vertical wall girders, or pier panels, were completely rusted out.

Fig. 38 shows the start of the radiator and conduit installation. The top photo shows one end of the special brackets that were made up. These were used to support one end of the electric baseboard radiators. This picture is at the kitchen radiator location. Two 1/2" conduits were run from the large electric locker near the kitchen to the forward end of the car. One is for power and the other one is for the call bells and telephone lines, a communication conduit in other words. The middle photo is one of the 5" box that is used to connect the communication conduit to another 1/2" conduit that crosses over to the opposite side of the car and terminates in a box in BRM C. More about this later. This conduit is under the wood floor of the car. To the extreme right, in the middle photo, is another 5" electrical box. See Fig. 39. This box, which is connected into the power conduit, has a 3/4" branch conduit that goes under the hallway and connects to the 5" box in the lower compartment of the Steward's locker. See Fig. 33, lower left photo. We used this conduit to connect the hall heaters to the wall thermostat that is in the hallway. From this 5" box, a second 3/4" conduit continues to cross over to the opposite side of the car. This conduit was put in for possible future use, and is under the wood floor. It is from this 5" box that we have 1/2" conduit that passes through the floor to the under car conduits. See Figs. 35 and 36. It was used to connect to the hall thermostat, see Fig. 39A.

The bottom photo in Fig. 38 is of the installation of a 500 watt electric heater under the window in the Steward's section. It also shows the 5" box for the communication conduits.

## Electric

We did some extensive rewiring of the under car conduits. As we did this, we made diagrams to show where all of the conduits were located and where they originated and terminated. Then we documented each and every wire that was in these conduits. See Fig. 40 for an idea as to the under car conduit layout. The next 10 pages document all of these wires, which ones are in each conduit, and what is each wire's function. Several of these pages show the routing of some of the more important circuits. Also there is a list of the spare wires that we pulled in for future applications.

The main electric locker (near the kitchen) has three circuit breaker panels and a large box containing four switches. See Fig. 41. The top two CB panels, #1 and #2, are also shown in Figs. 41A and 41B. These panels are 240 volt three phase. Panel #1 is for the lighting, appliances, and some heating circuits. Panel #2 is for the air conditioning and some more heating circuits. Not all of the CB positions have been utilized; we pulled in many extra wires for future use. These unused circuits are: stove, air pump, water and sanitation tank freeze protection, Diesel engine block heaters, and one side of the lounge heating.

The bottom two circuit breakers in Panel #2 are for the lounge heating. They are powered by a relay, which in turn, is controlled by the lounge thermostat. We will expand on this when we discuss the heating circuits.

The 120 volt CB Panel #3 is normally powered by two 240 to 1209 volt single phase transformers. A 3 KVA transformer is for the appliances and is designated transformer A. A 2 KVA transformer is for the lighting and is designated transformer B. The 120 volt CB panel is split between these two transformers. See Figs. 42 & 42A for the designated circuits and some of the wire identification. Some of the wire colors used at the Steward's CB panel is on the next page. The wiring colors for the two transformers are also shown. As you can see, there are a total of four CB panels on the car.

There are four selector switches on the switch panel box in the main electric locker, see Fig. 41. Each one of the CB panels (#1, #2 & #3) has a power selector switch associated with it. These switches select which power source will be used to provide power to that panel. The two 240 volt panels, #1 and #2, use a three position switch to obtain their input power. There are three different sources, Generator #1, Generator #2, and Standby/Shore power (STBY). See Fig. 43 for the wiring of these switches.

When we began to install the HEP on the car, we decided that it would be easier to add a two position, three phase master switch in series with the standby wires rather than change the two selector switches for panels #1 and #2. This is a large switch in the upper right corner of the switch box. The purpose of this switch is to select either HEP or STBY power. See Figs. 44 and 44A for the wiring diagrams.

As mentioned previously the 120 volt CB panel, PANEL #3, can obtain power from three different sources. The selector switch for this panel is a four position switch. See Fig. 45. In the extreme right hand position, this switch will provide power from the 120 volt under-car receptacle. This receptacle is located next to the AC compressor. In the next position, power will be obtained from the 240 to 120 volt transformers. The third position, or center position, is the OFF. The last position, on the extreme left, is for the 32 volt train line connection.



There is a small panel, in the main electric locker, to the right of CB Panel #1, which should be explained. See Fig. 46. 12 volts DC is required in order to operate the call bell system. We elected to obtain this supply voltage from the Diesel generator starter batteries. The top most switch is used to select from which generator battery the power will be obtained, A or B. The second switch is used to direct the output of a small battery charger to either of the generator batteries. It also will turn on this charger. We felt that a small battery charger, that could be used to maintain the batteries during periods of non-use of the generators, would be a good idea. We have not yet installed this battery charger.

The next switch, moving down to panel, is to turn on the air conditioner heater. This is actually a small circuit breaker rather than a switch. This is for a small heating element under the AC compressor used to keep the oil warm.

The bottom two switches are small circuit breakers used to provide protection for the wiring to the two panel voltmeters. These voltmeters are positioned on the generator control panel located in the kitchen. In each of the two 240 volt CB panels there are ammeter shunts. This was provided so that the three phase current drawn by each panel can be observed. There are switches on the generator control panel to activate the various meters. See Fig. 46A for the wiring of this panel, and Figs. 46B and 46C for more wiring information.

## Call Bells

The call bell system for La Condesa as originally designed had 12 call “stations”. The lounge was divided up into 8 “stations”, four on each side. There were also four additional call bell buttons for the rear door., writing desk, toilet, and the section seats. As such, the annunciator display box has 12 “drops”. Whenever any call bell button was pressed, a small metal “drop”, with a number or a letter on it, would drop down into view at the display box. A bell would also ring to ensure the Porter’s attention. This “drop”, with its number or letter, would then indicate the location, on the car, of the person who rang the bell, hence the name call bell.

The lounge had numbers 1 to 8, with numbers 1 and 2 on opposite sides, nearest the open platform. The letter “P” was for the platform door, “T” FOR THE TOILET, “s” FOR THE SECTION SEATS, AND “d” FOR THE WRITING DESK. The section seats have two call bell buttons, one for each seat, but they both cause the same “S” indicator to drop.

Since Mr. Finley added three bedrooms to the car, we had to modify the annunciator system to accommodate these changes. We did this by combining the 8 lounge “stations” into four. See Figs. 47, 47A, 47 B, and 47C for more information. This then freed up four “drops” for other uses. We used three of them for the bedrooms and added a call bell button at the forward door.

There is a terminal strip that connects some of the annunciator wires to the new call bell wires and it is located on the ceiling of the small locker to the left of the kitchen locker. See Fig. 48. The call bell wires for BRMs B and C are in the bedroom side communications conduit. While we were doing all of this new wiring, we added extra wires for possible future use. At the main electric locker, there are some of these extra wires. See Fig. 48A. There is a two wire shielded cable that runs to the forward door. This cable could be used for a possible future intercom at the forward door. There is also an extra three wire cable that crosses over to the annunciator terminal strip, currently not used. We also ran in an extra three wire cable to the forward door.

There are also four other unconnected wires in the main electrical locker which should be discussed. The purple and blue wires are from the battery charger switch, previously described, and

can be used to turn on this charger. These wires are in series with the charger switch and are connected whenever the battery charger switch is placed in either the A or B position. The black wire is for the positive charger output and the white wire is the negative return.

The communication wiring at BRM A is shown in Figs. 49 and 49A. We pulled all of the wires into a junction box located in the corner locker of that room. The distribution of these wires and the spare wires is shown. Figs. 49B and 49C show more of the hall side communications wiring. Fig. 50 shows the hall side conduit layout for the power and communications.

One project that we undertook was to replace all of the plumbing in the car. We did not complete this job, but we did change out all of the plumbing from the kitchen to BRM A. More on this later. While we were at it, we also put in a communication conduit on the bedroom side of the car. See Fig. 51. This conduit contains four cables, a 6 wire telephone line, a three wire call bell line, a three wire shielded spare line, and a two wire spare line. See Fig. 51A for more details. To summarize, the call bell wires for BRM A are in the hall side conduit and the call bell wires for BRMS B & C are in the bedroom side conduit.

## Heating

The master plan for the heating is shown in Fig. 52. We planned on a total connected load of 15,000 watts. All of the heating elements have been installed except for the general toilet and the bedroom side of the lounge. The next three pages show our design work. See Fig. 41A and you will note that there are a total of six circuit breakers for heating. The overhead CB has not been hooked up. The kitchen heat DB and the forward hall CB are in the top box, Panel #1. The remaining four are all in the next box, Panel #2. We tried to split the heating load between the two generators. The bottom two CBs in Panel #2 are not connected to the main bus bars in this box. We split them off so that they could be energized by a thermostatically controlled relay. This relay is mounted in Panel #2 and operated by the lounge thermostat located on the hall side wall of the lounge.

Fig. 53 shows the layout of the bedroom heaters and the power conduit. Each bedroom has its own thermostat. We added one 120 volt outlet in BRMs A & B and two in BRM C. See Fig. 53A for the wiring diagram. Note that the three wires from the Stewards CB panel are for the kitchen refrigerator outlet. How these wires get there, I don't remember.

## Plumbing

As mentioned before, we removed all of the old plumbing from the kitchen to BRM A. This was necessary because Mr. Finley has used galvanized pipe in several locations and we wanted to add a few things. See Fig. 54 for the work done in BRM A. The top photo is of the space used for the location of the new baseboard heater. This is after we had removed all of the old piping and cleaned up the outside wall of the car. We used "unistrut" to mount the new pipes and conduits. As mentioned previously, we also added two ½" conduits to this side of the car for power and communications. We started out new plumbing at the toilet in this room.

This middle photo in Fig. 54 is after we installed the electric heater using homemade brackets. It should be mentioned that we installed two ½" hot water pipes. This was so that we could install a circulating pump in the hot water lines to keep these pipes hot and in that way save water. One pipe is the feed and the other the return. They are looped together at the toilet. With

this arrangement, passengers would not have to let this water run until it got hot at their sink. A thermostat and 120 volt outlet for this room were installed in the armrest of the sofa seat.

We also put in a 1/2" copper line for an air supply to all of the toilets for future installation of "Microphor" toilets. The bottom photo is of the left side of the heater near the sofa seat. To reiterate, the top pipe is the air supply, the next two are the hot water lines, the fourth pipe is for cold water and the bottom pipe is the power conduit. See Fig. 54AS for a schematic representation. Not shown is the finished job with the radiator cover in place.

Fig. 55 is of the installation of BRM B. The top photo shows all of the piping in the area that is now behind the "Microphor" toilet. The tap off connections to the air line and cold water pipe are visible. To the left is a small 500 watt heater, mounted also with specially made brackets. The next photo shows the left side of this heater where it abuts the closet wall. The hot and cold water pipe fittings for the sink are protruding through the board used for mounting the radiator cover. The sink drain pipe is in front of the heater. Fig. 55A is a schematic diagram of this room. A thermostat and 120 volt outlet were added to the wall near the sofa seat.

In Fig. 56 the piping is shown as it traverses the bottom of the small closet in BRM B. The top photo is before we installed the cover, which is shown in the bottom photo. Note the small electrical box on the right side,. This is for the call bell connection for this room and is connected into the communications conduit. The "Wiremold" conduit shown on the left in the bottom photo is for the hall thermostat connection.

The "hall" indicated in the drawings is actually the space in front of the shower. Fig. 57 shows the work done there. In the top photo, the right hand wall is that of BRM B. The four pipes and two conduits are shown as they exit BRM B. On the left you can see the old shower pipes. They are the ones going up in the photo. Also shown is the 4" electrical box that we added in the power conduit line. A 1/2" conduit from this box goes under the car and a 3/4" conduit connects to the electric box in the lower part of the Steward's locker. This conduit was previously mentioned, see Fig. 33 lower left photo, as a spare conduit to cross over from one side of the car to the other. In the middle photo one of the new floor support beams that we added is visible. The bottom photo is a more detailed view of this area near the 4" box. Also shown are the new water lines to the shower, complete with shut off valves.

The top photo in Fig. 58 is after we installed the 500 watt heater. The bottom photo is of the almost complete installation. The thermostat for this heater is located on the wall to the right. See Fig. 58A for more details.

We then moved on into BRM C where we encountered several problems. The top photo in Fig. 59 is what we uncovered when we removed the flooring near the old ice box, now the shower. As can be seen, the ice water seeping from this former ice box rusted out quite an area of the steel sub-flooring. The bottom photo is of the same area but also shows the old piping arrangement to the sink and toilet in this room. The wood flooring can be seen as well as the perpendicular cross beams. Finley's people just notched the flooring to accommodate the piping.

The top photo in Fig. 60 is of the repaired area next to the old ice box, complete with new cross beams. We were able to get the piping through the shower area by using the old steam line passageway along the outer wall of the car. The black area next to the repaired section is of the old steel sub-floor that was covered with tar, by Pullman, before the insulation was put in. The old insulation was in the form of batts that were also tarred and then were nailed to small black wooded strips that ran across the car.

The middle photo shows the initial work of installing the plumbing for the sink and toilet in this room. The area next to the shower has been completed and new plywood and insulation installed. The black area where the new pipes are is again the old steel sub-floor. The small black wood strips shown are those used for holding the old insulation in. Also shown is the small electrical junction box installed in the communication line and the larger 4" box installed in the power conduit. Note that the cold water pipe has now been increased in size to ¾". The bottom photo is of the completed installation of the crossover piping. The pipes are installed beneath the floor but on top of the white insulation. Shut off valves for these three pipes were also installed.

In Fig. 61 are shown more of the plumbing and wiring details. A new plywood floor has been installed over the crossover piping. The lower photo shows the 1000 watt heater installed, attain using custom made brackets. We also installed two 120 volt wall outlets in this room and a jack for the telephone. See Fig. 61A for a schematic diagram.

Fig. 62 shows the piping to the "combolet" in this room. The top photo is of the area occupied by the desk before the flooring was put back. The middle photo is after the flooring was replace. The bottom photo is of the outside wall of BRM C after the radiator covers were installed. Note the trap door for reaching the shut off valves.

We next moved on to the kitchen. The top photo in Fig. 63 is of the piping beneath the kitchen sink. The bottom photo is of the piping behind the stove. The small pipe in the upper portion of this photo is the gas line to the stove. We had to move all of the pipes away from the wall of the car in order to get into the locker, which was the next location for the plumbing. Fig. 63A is a piping diagram for the kitchen and the adjacent closet.

The closet or locker next to the kitchen stove is where we ended our plumbing job. Fig. 64 is a photo of where we left off. The main water feed for the car comes up through the floor in a ¾" brass threaded pipe. We added a shut off valve into our ¾" copper feed line. We also added a tap off for a pressure gauge, which was mounted on the wall above the stove. This gauge will read the actual water pressure. A tap off was also added into the air line and a second gauge was mounted next to the first one. This gauge will read the air pressure to the toilets. Our ½" hot water feed line was temporarily connected to the old brass hot water line as it comes from the general toilet,. We included a shut off valve in this line and it is the stainless steel flexible pipe shown in the photo. We naturally capped the hot water return line. The communication conduit was connected to the rest of the system. See Fig. 51A. The power conduit has not been connected since we elected to bring all of the necessary wiring up through the 4" box shown in Fig. 57. Fig. 64A may be of some help in locating the various pipes.

Figs. 65 and 65A show the installation of the "Microphor" toilet in BRM B. The top photo, in Fig. 65, is after we plugged the old toilet drain hole that went through the floor. The black PVC pipe is the new drain. The middle photo is after we installed the wood frame from the old toilet housing, the toilet itself, and all of the air and water lines. We wanted to utilize the old toilet housing as much as possible. The air sequencing valve with its multiple colored hoses can be seen against the back wall. The red knob protruding from the wood housing is to shut off the water supply in the event of a failure of the sequencing valve to shut off the water. The bottom photo is another view of the installation. We wanted to preserve the old toilet's unique pull up knob feature to flush so we had to mount the actual flush knob near the floor. Note its location on the floor near the end of the radiator grill. The air pressure regulator and oiler are located on the left side wall.

Fig. 65A is after the shroud was installed and the old original seat. The upholstered seat is in the upright position. Also shown is the sanitation holding tank that was fabricated for the car. This tank was custom made to fit where the old propane locker was on the car. This location is directly beneath the shower. The tank has a capacity of about 138 gallons. There are four 1 ½" threaded openings for the four eventual toilets. There are two 2" drain holes, one on each end, a clean out plug on the front, and a vent hole in the back. One of the drain holes has been plumbed with two shut off valves and a discharge outlet. The piping is such that a second discharge outlet can be run to the opposite side of the car. The tank was hung using the four original brackets from the old locker and adding two newly fabricated ones.

Since this sanitation tank is directly under the shower, we had to repair the wood beneath the shower before installing the tank. Fig. 66 shows the underside of the shower before restoration. The round tube in the center is the old ice box drain, now the shower drain. This drain had to be routed around the new holding tank. The photo shows some of the rotted wood. A new ½" conduit is on the right. The photo was taken before the floor repair work in BRM C was completed, so you can see right into BRM C. The blue object is a tank vacuum cleaner in this bedroom. See Figs. 66A and 66B for more details.

## Water Raising System

All railroad cars used air pressure to bring the water from the under car tank up into the car. The old water raising system used a governor and a reducing valve to accomplish this. We had to replace these units due to leaks. See Fig. 68 for more details of the old valves that Pullman had installed. Someone may be able to rebuild them. Fig. 67 shows the new repiping of the air system in one end of the water tank. We replaced the old reducing valve with one manufactured by Wilkerson and the governor valve with one by Teel.

Air from the air brake system goes through the governor valve and then to the APW (Air Pressure Water) reservoir. This pressure will be at whatever the train line brake pressure is, usually 110 psi for a passenger train. The governor is usually set for 60 psi. In this way, if the brake pipe pressure is less than 60 psi, the valve remains closed. Only when the pressure exceeds 60 psi, will the valve open. This is to prevent the water raising system from bleeding off the brake pipe when it is below 60 psi. Air from the APW tank was piped to the reducing valve and then to the water tank. The reducing valve was set to maintain a pressure of 30 psi on the water tank. While we were at it, we added a line to go up into the car for the air supply for the toilets and a line into the locker under the main toilet for a future air pump installation.

In Fig. 67 the black item with the handle, which is on the left, is the governor valve. The regulated is on the right with the gauge on the top. We added three air gauges, one to measure the brake pipe pressure, one to indicate the APW tank pressure, and one for the water tank pressure. The wires shown in the water tank housing are for the eventual installation of the water tank protection heaters, the kitchen stove, and for the kitchen outlets. See the first page after Fig. 40 for more details. In Fig. 68 and the following pages are shown the old governor and reducing valves.

## Amtrak HEP Modifications

In a separate envelope are some pictures of the HEP, MU, and the 27 pt connector locations. Dimensions for these connectors are also included.

Figure 101 shows “gauge showing where HEP location should be OBS end”.

Figure 102 shows “gauge showing where HEP location should be OBS end”.

Figure 103 shows “gauge shows location of HEP connector forward end of car left side”.

Figure 104 shows “HEP location forward end”.

Figure 105 shows “HEP location right side forward end”.

Figure 106 shows “required HEP location forward end”.

Figure 107 shows “possible HEP location forward end”.

Figure 108 shows “M.U. & 27 point location OBS end”.

Figure 109 shows “test fit for M.U. Connector”.

Figure 110 shows “test Fit for 27 point connector”.

Figures 111 – 116 show Amtrak HEP specifications.

## Final Thoughts

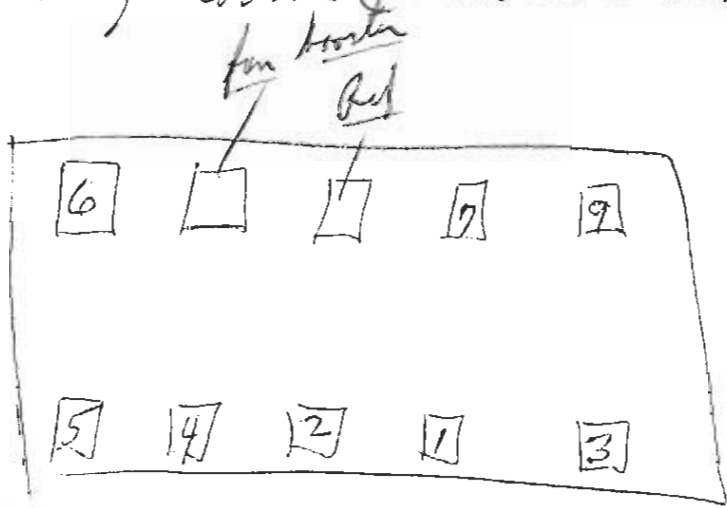
Some last thoughts and ideas. The old steam pipes need to be removed from the bedroom side of the lounge and replaced with an electric heater, wiring for this is already in place. The plumbing needs to be continued into the general toilet and then to the bar area and a new toilet installed. An air pump should be added and piped into the water raising system for more convenience in getting running water in the car. HEP wiring and the step down transformers also need to be added. MU and communication 27 point wiring is up to you. The platform steps need to be removed and all of the accumulated rust removed. Several of the bolts that hold the steps to the car have already fractured.

OLD wiring to fuse box

CRT #

- 1 Lta; Rear Hall; <sup>ceiling ltr</sup> Buffer, <sup>side Board</sup> Annunciator ltr  
teacher, one rear lounge ceiling, 533 platform
- 2 Blind end, berth ltr, ~~work~~ writing desk,  
markers, ref ltr, <sup>shower</sup> elec locker ltr
- 3 AC locker ceiling ltr, one rear lounge ceiling
- 4 8 sides ltr rear lounge - 2 crbs
- 5 6 side ltr dining room (PASSWAY & BR'F)
- 6 2 ceiling lamps dining room (BR'F & GALLEY)
- 7 Kit ltr + exhaust fan (BR'S A & B)
- 8 4 fans lounge (NOT IN USE)
- 9 4 fans dining room (side ltr Bdm <sup>ELITE</sup> <sup>ABSOLUTELY</sup> <sup>REPAIRING</sup>)

FIG 1



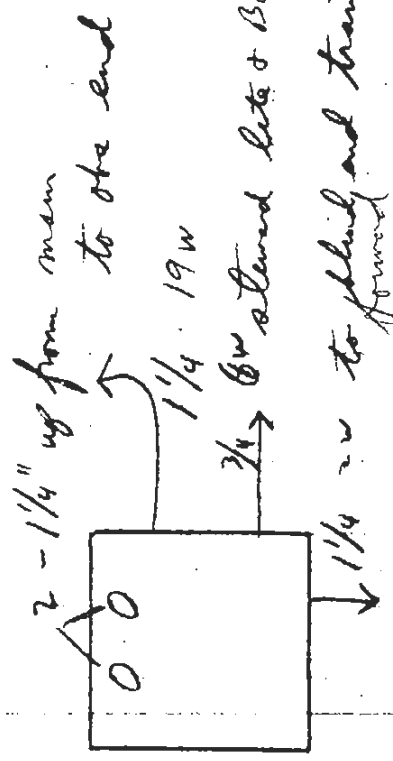
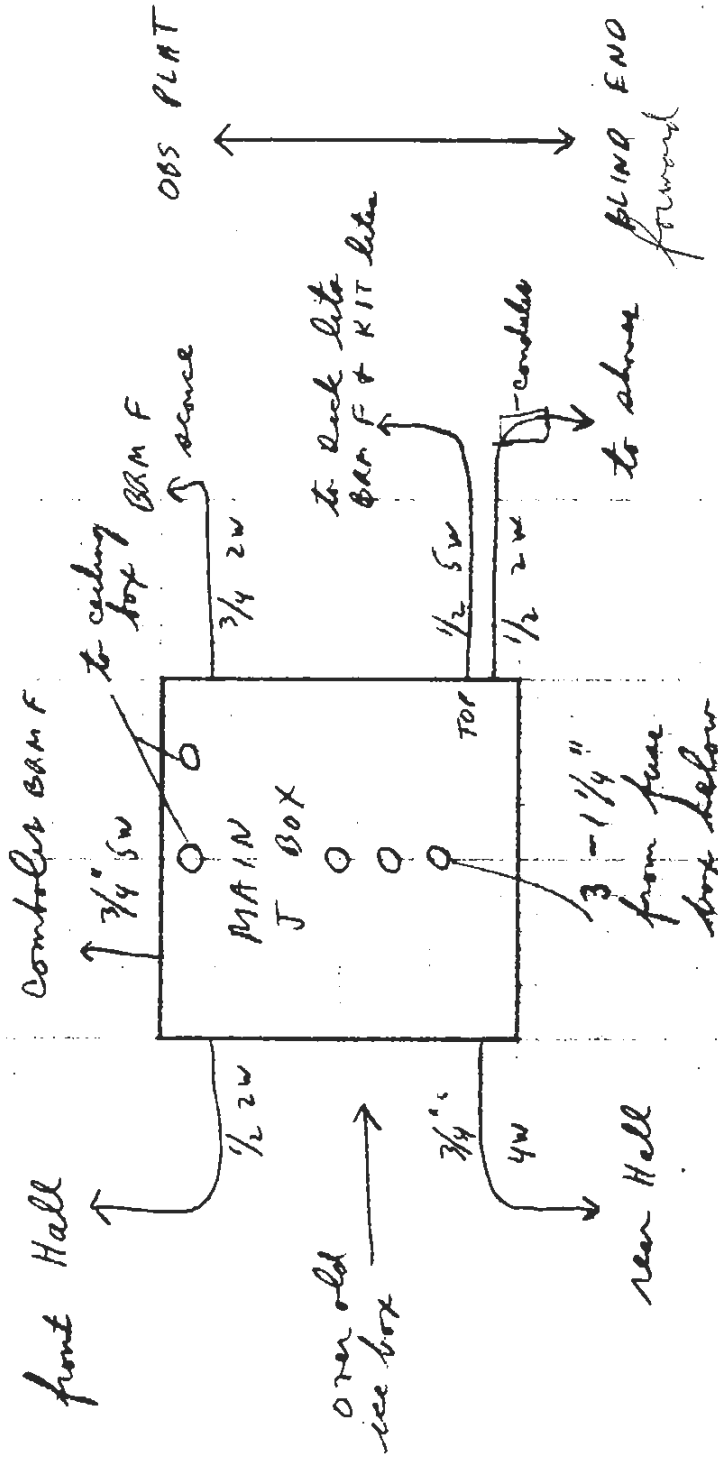


Fig 2

6/89  
Rum



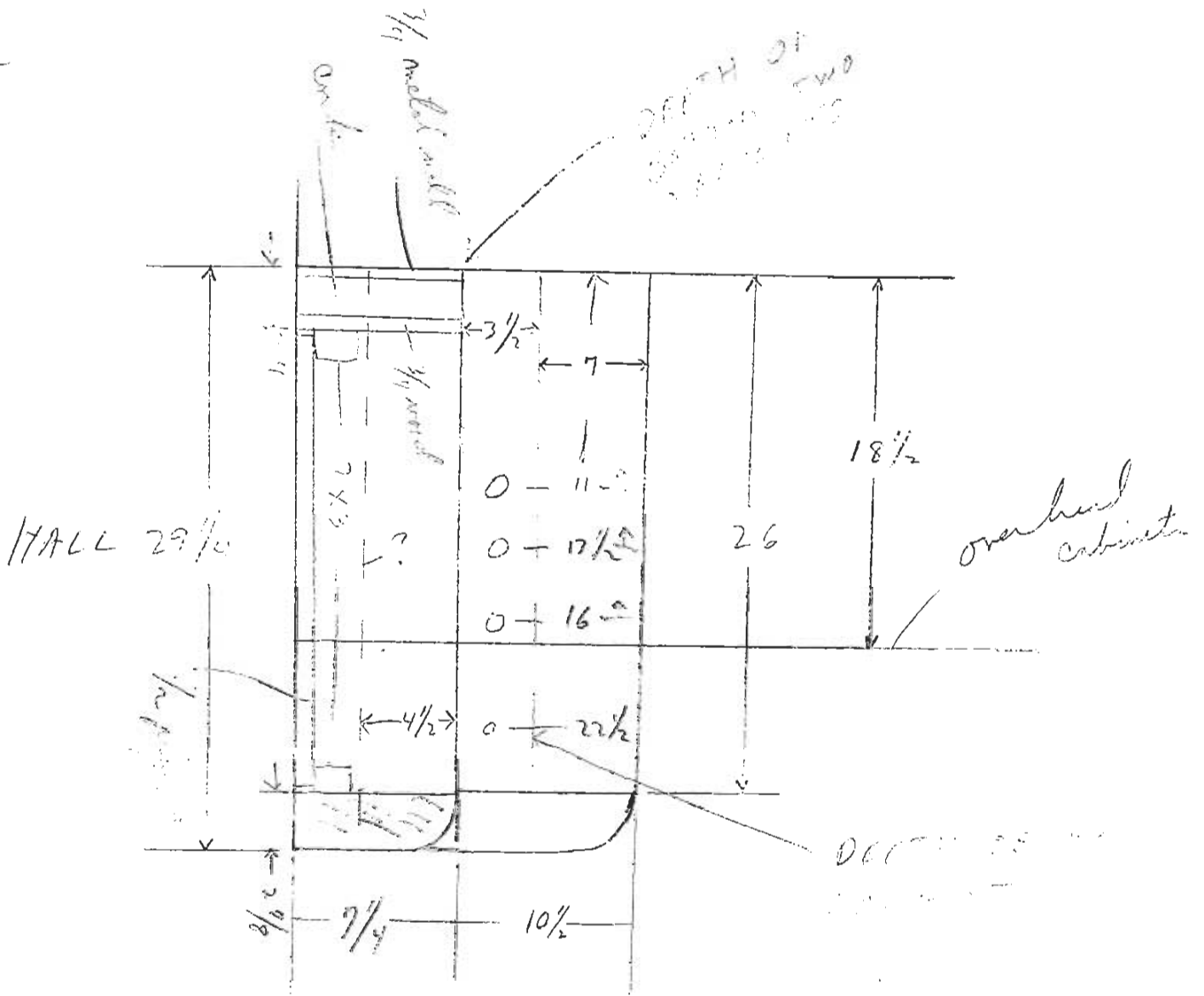


FIG 2 A

ELECTRIC CABINET

STEWARD'S AREA  
TOP VIEW

8/24  
Rena

Can conduct

1 87  
Ram

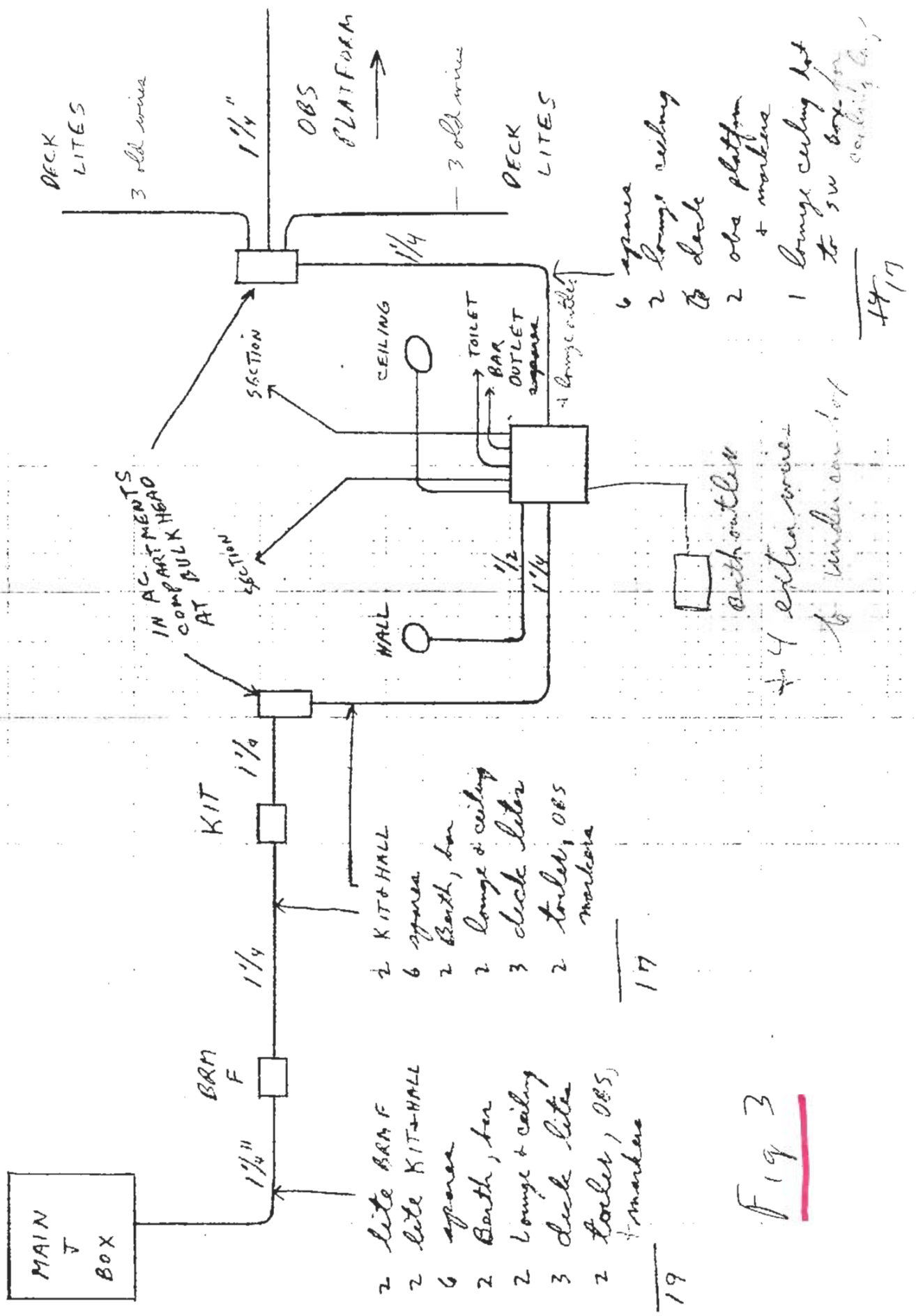
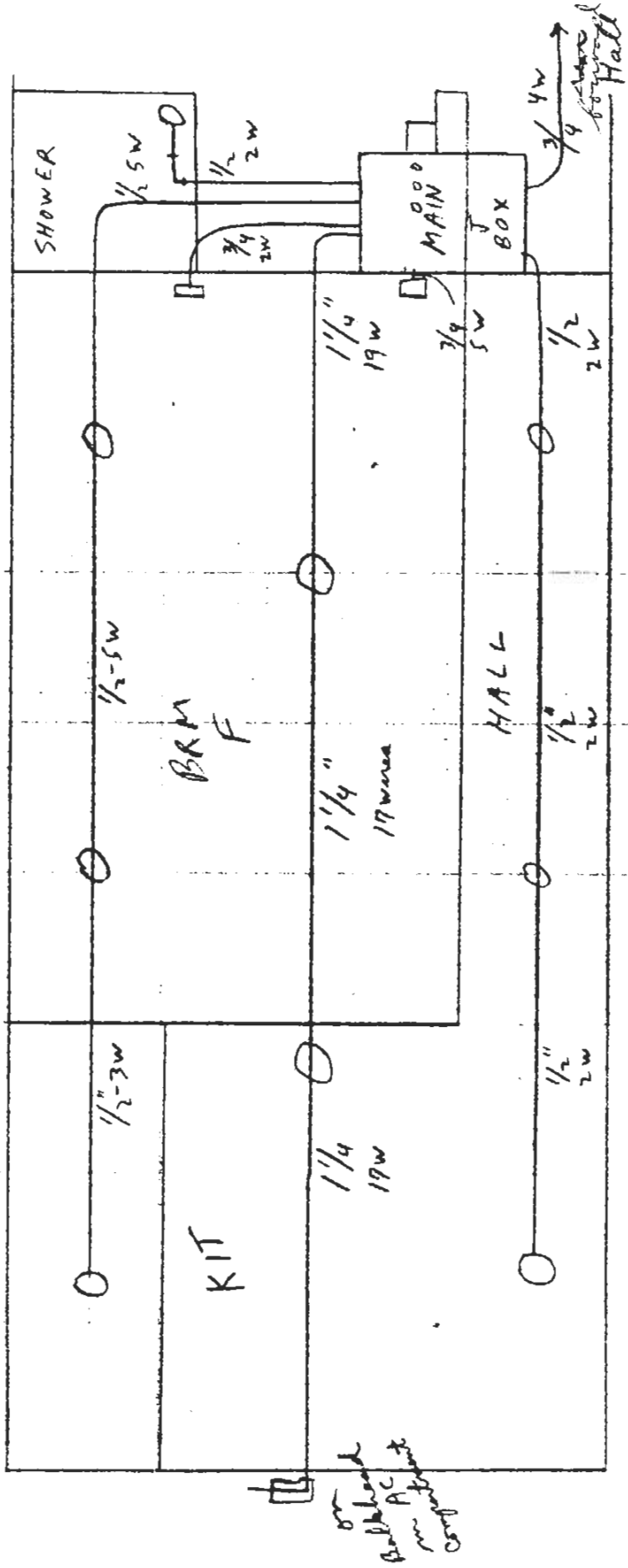
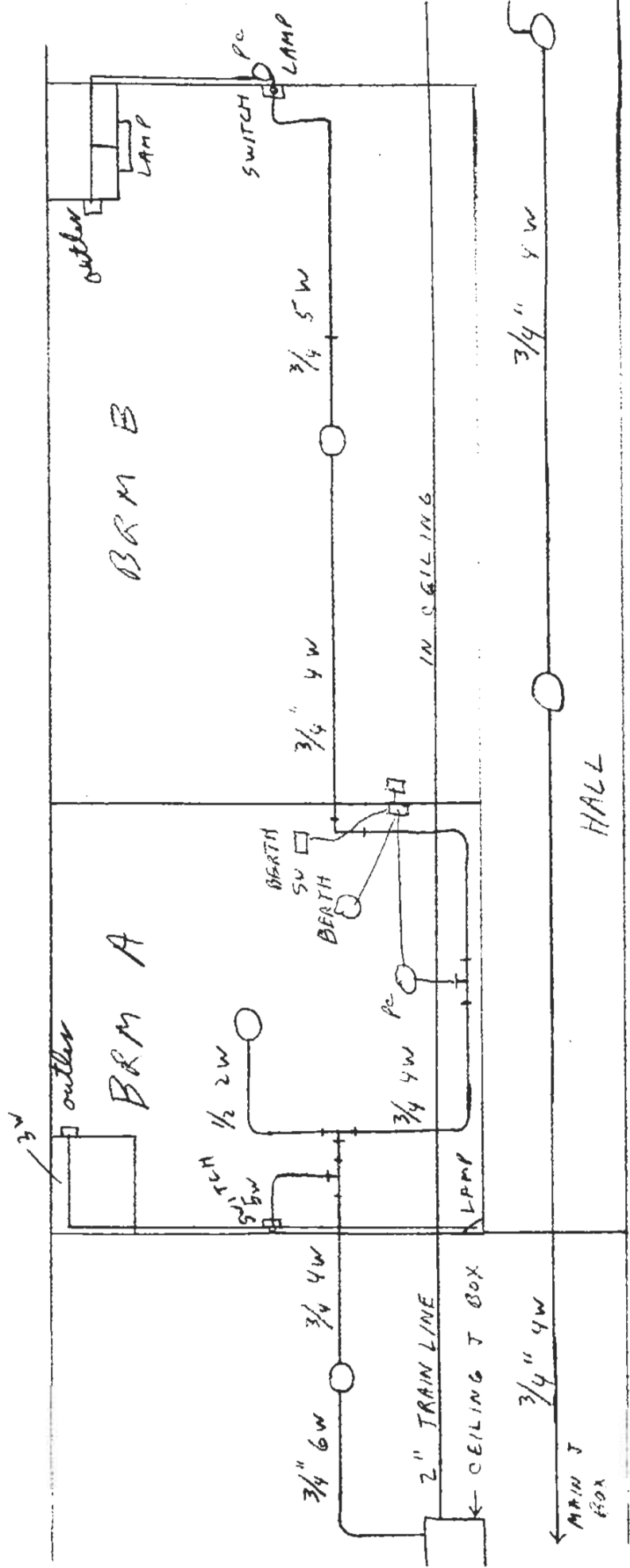


Fig 3



ceiling  
CONDUIT LAYOUT

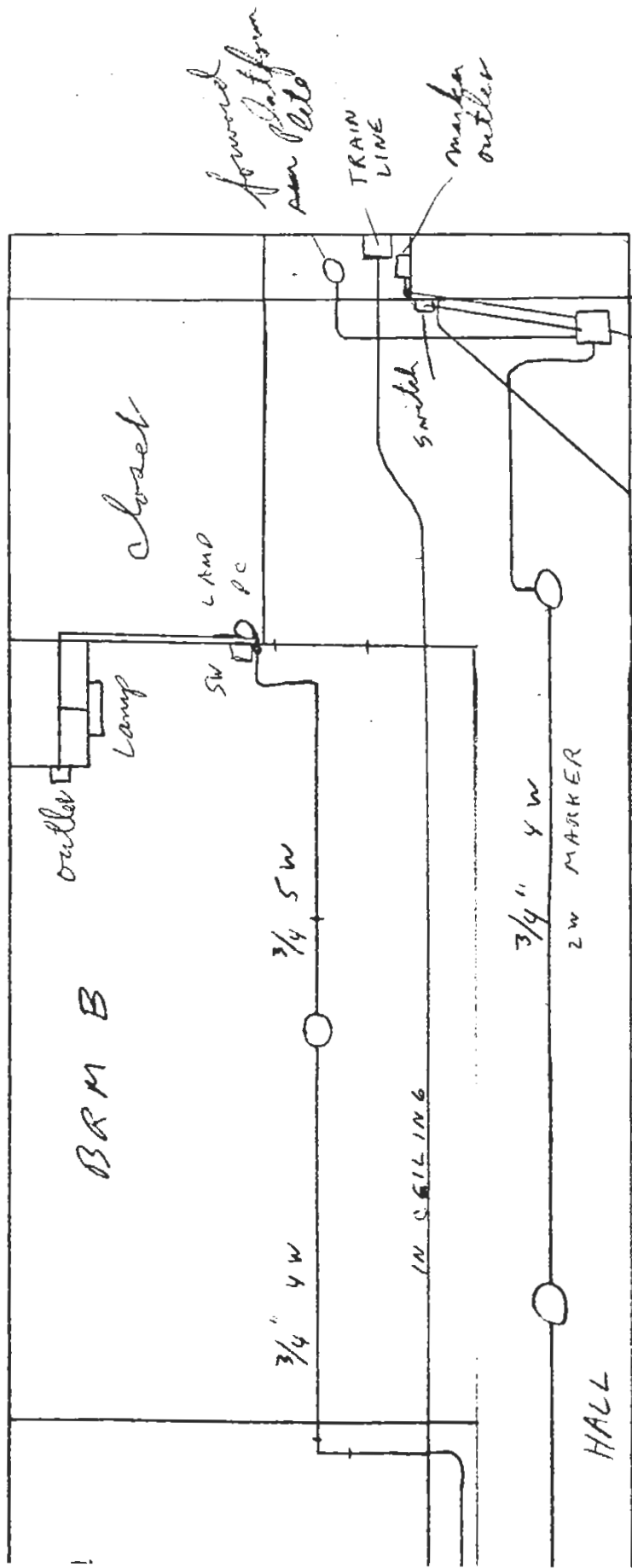
FIG 4



*ceiling  
CONDUIT LAYOUT*

Fig 5

2/90  
P. 100



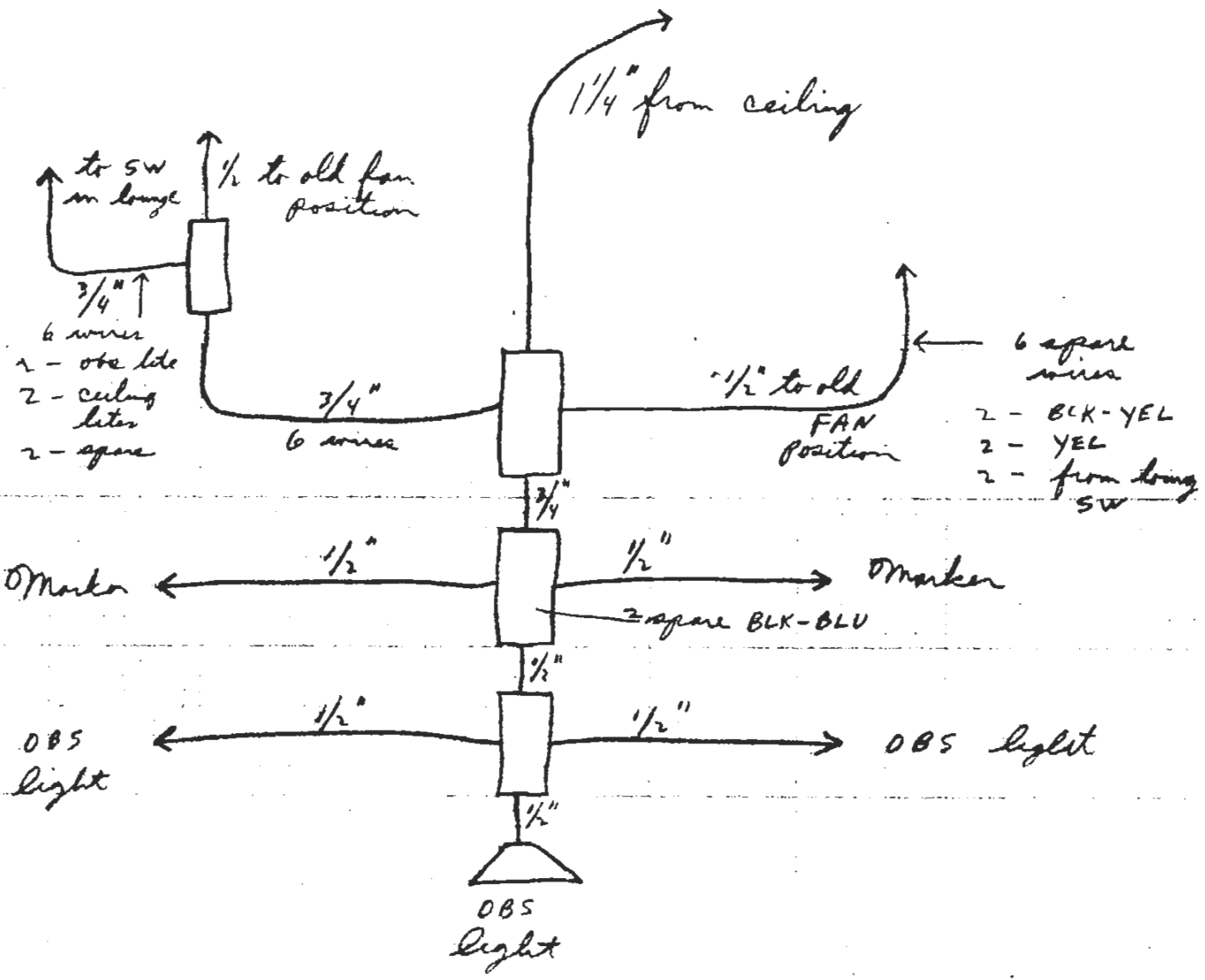
forward  
Platform  
see also

FIG 6

NDUIT LAYOUT

2/90

Plan 2/90



OBS PLATFORM CONDUIT LAYOUT

Fig 7

7/89  
 Ram

6/89

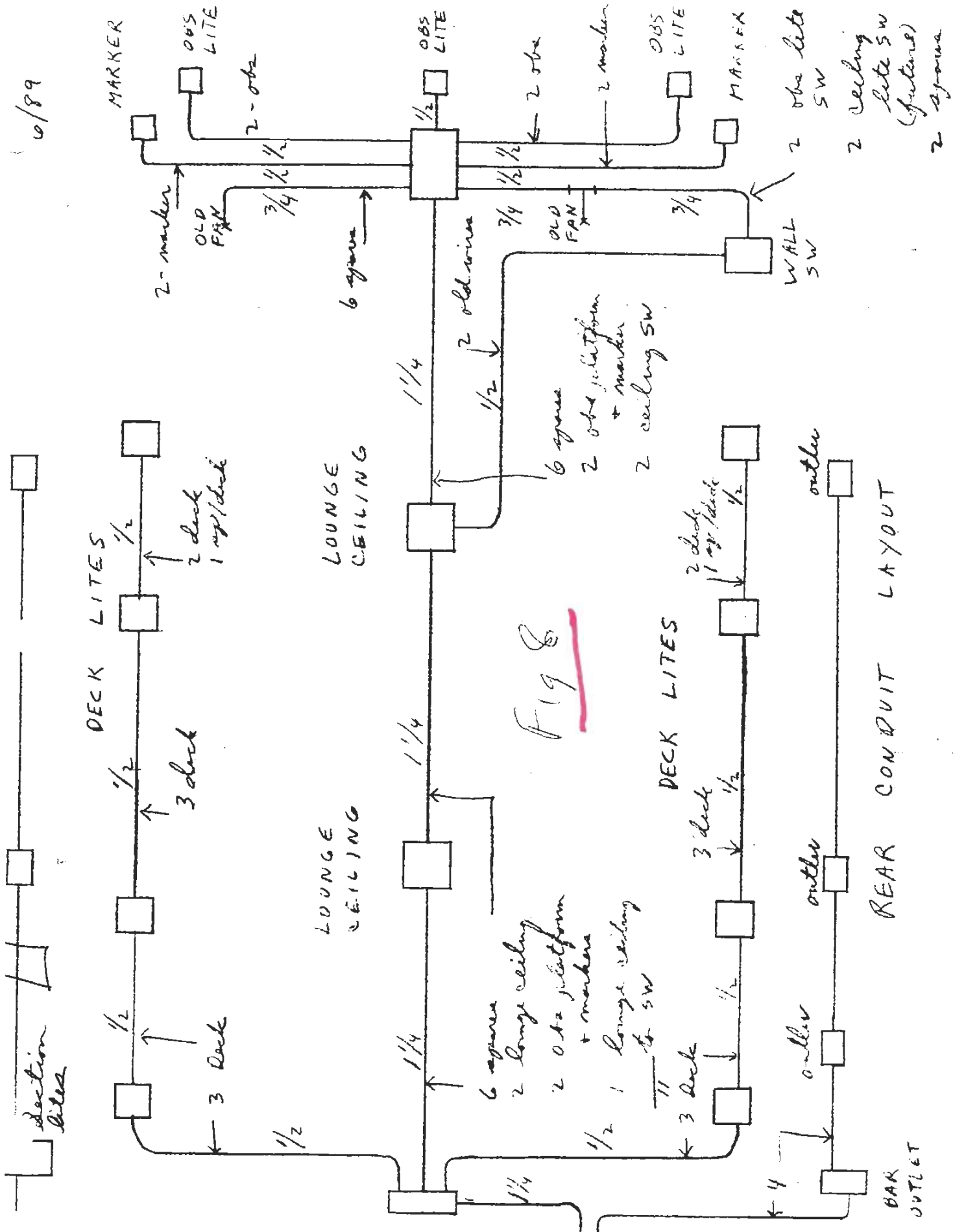


Fig 8

REAR CONDUIT LAYOUT

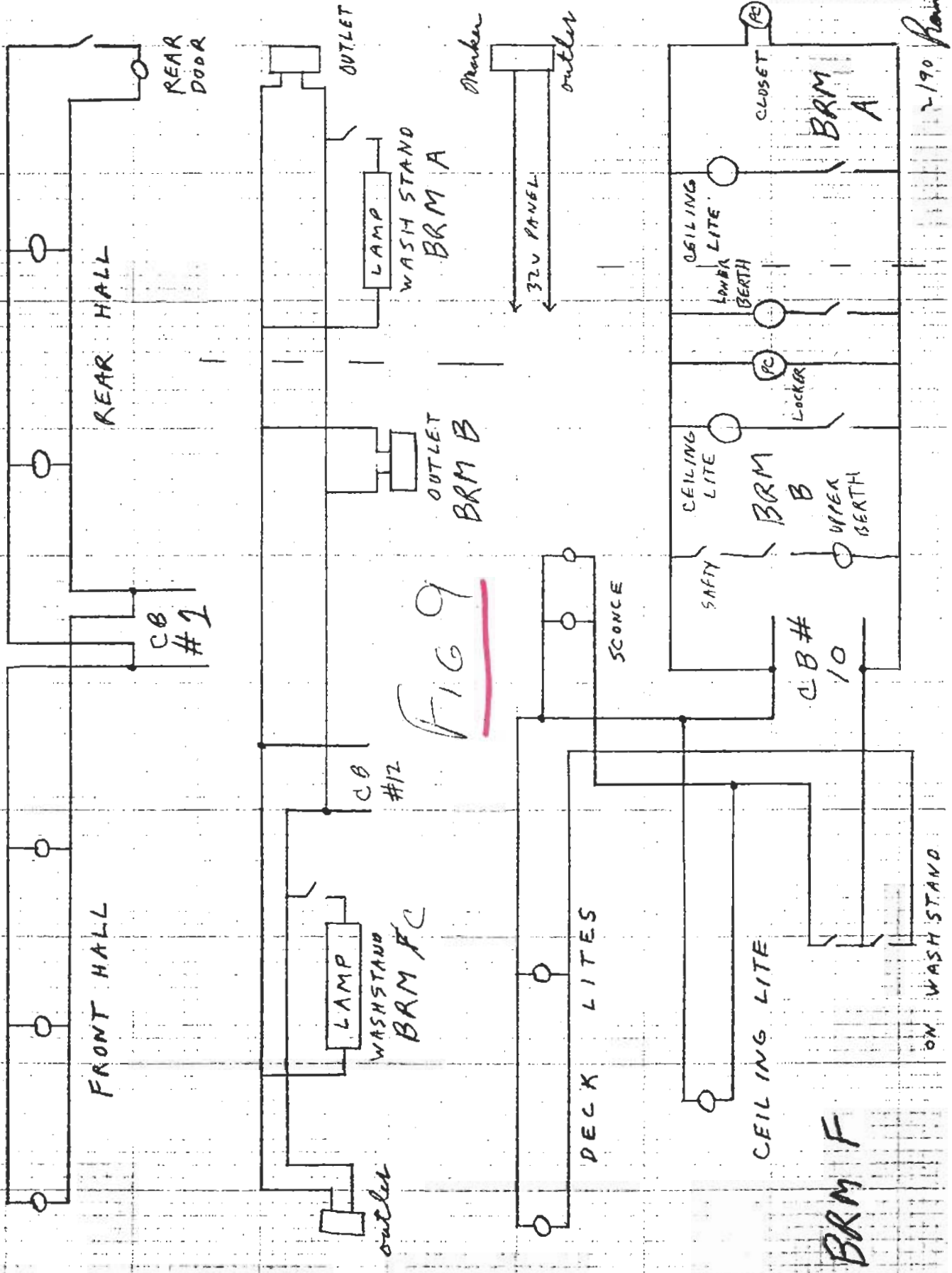


FIG 9



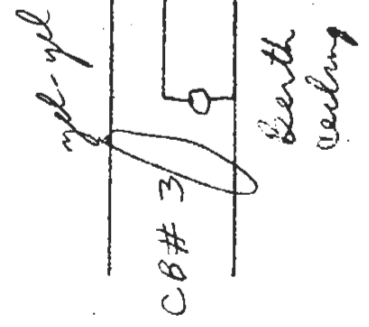
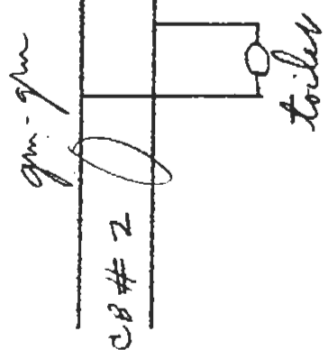
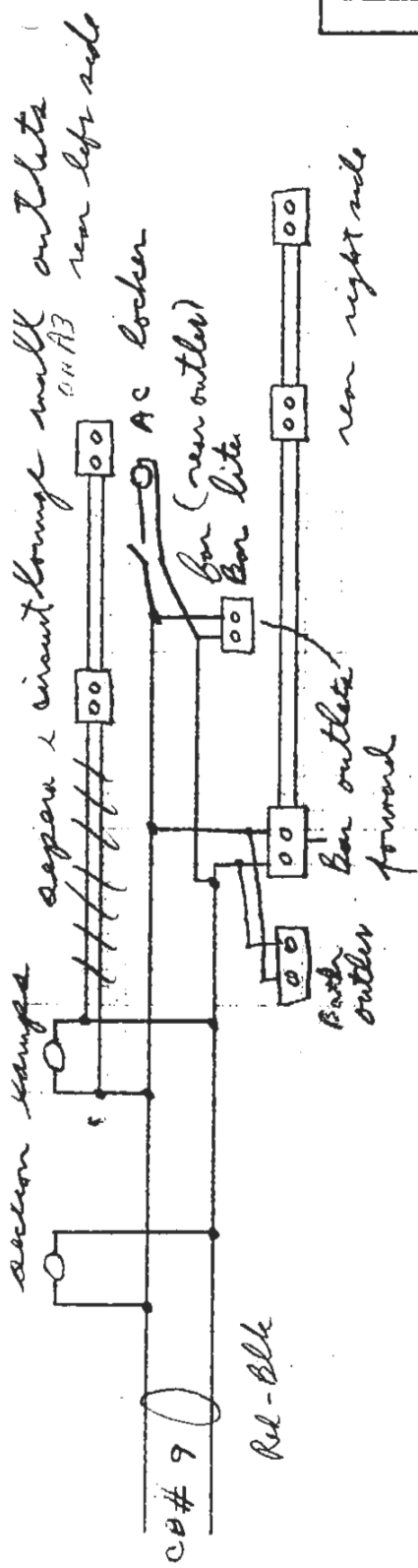
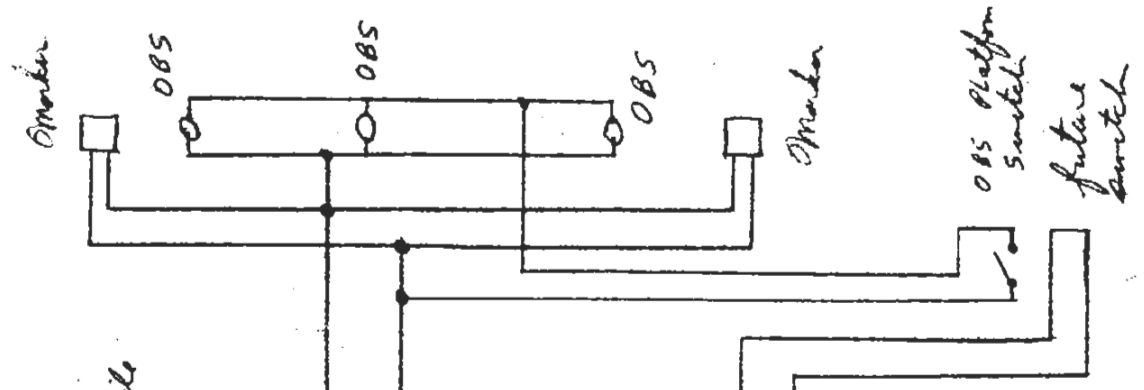


FIG 10 + 6 spare fuse box to OBS platform



9/89  
Ran

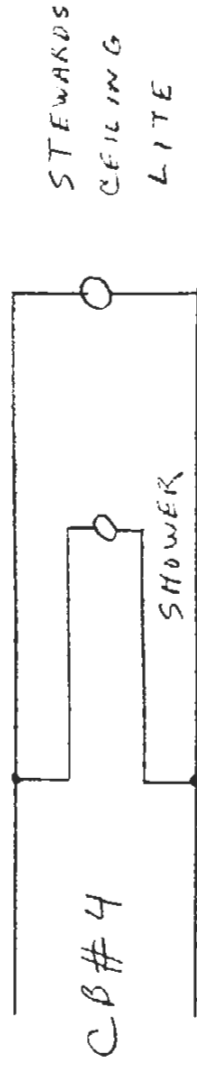
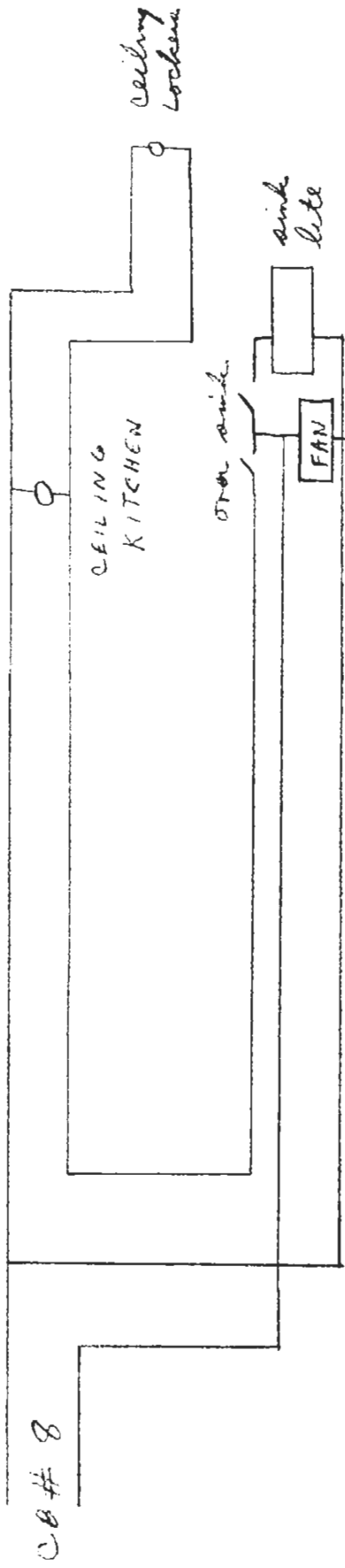
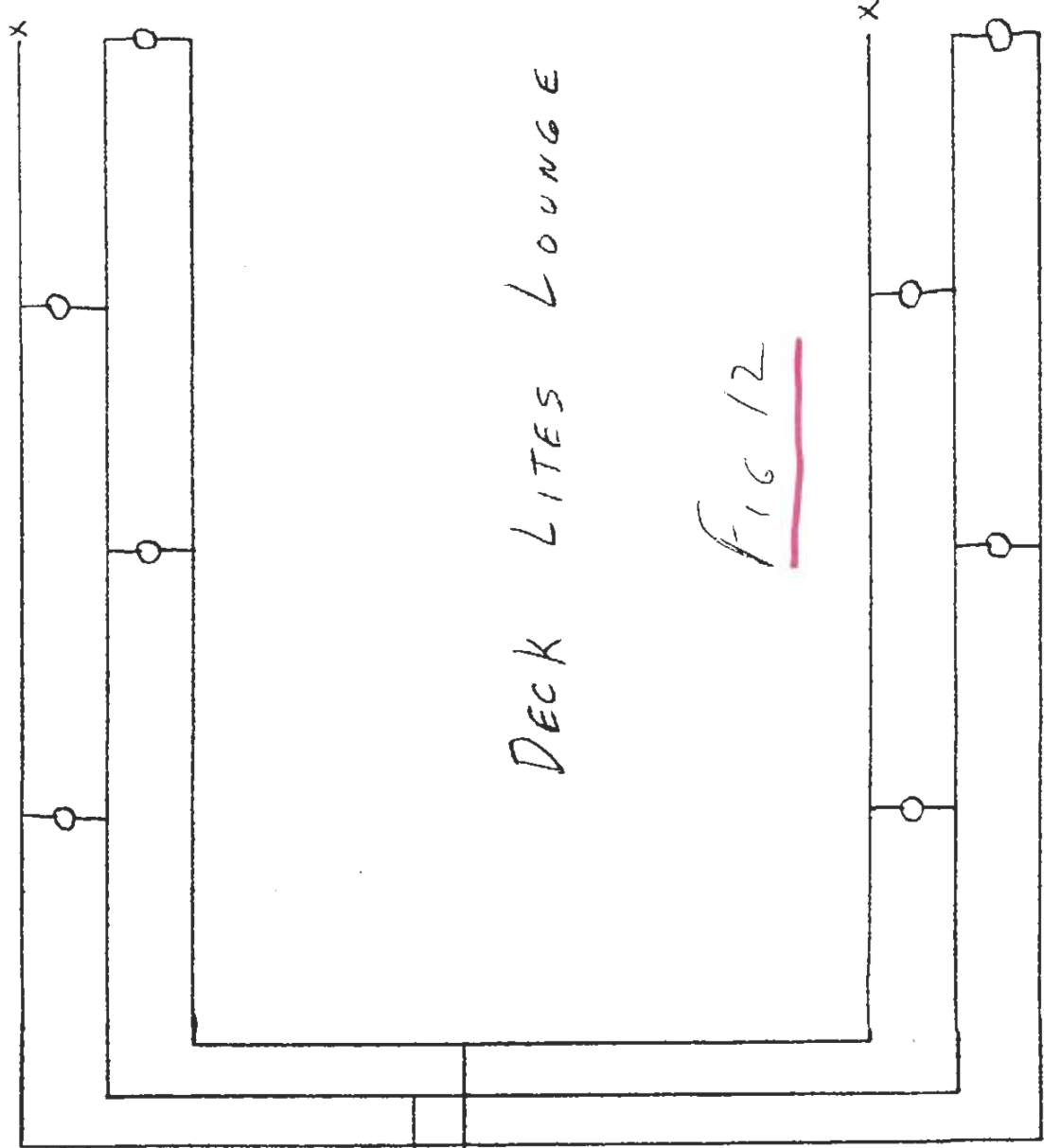


Fig 11

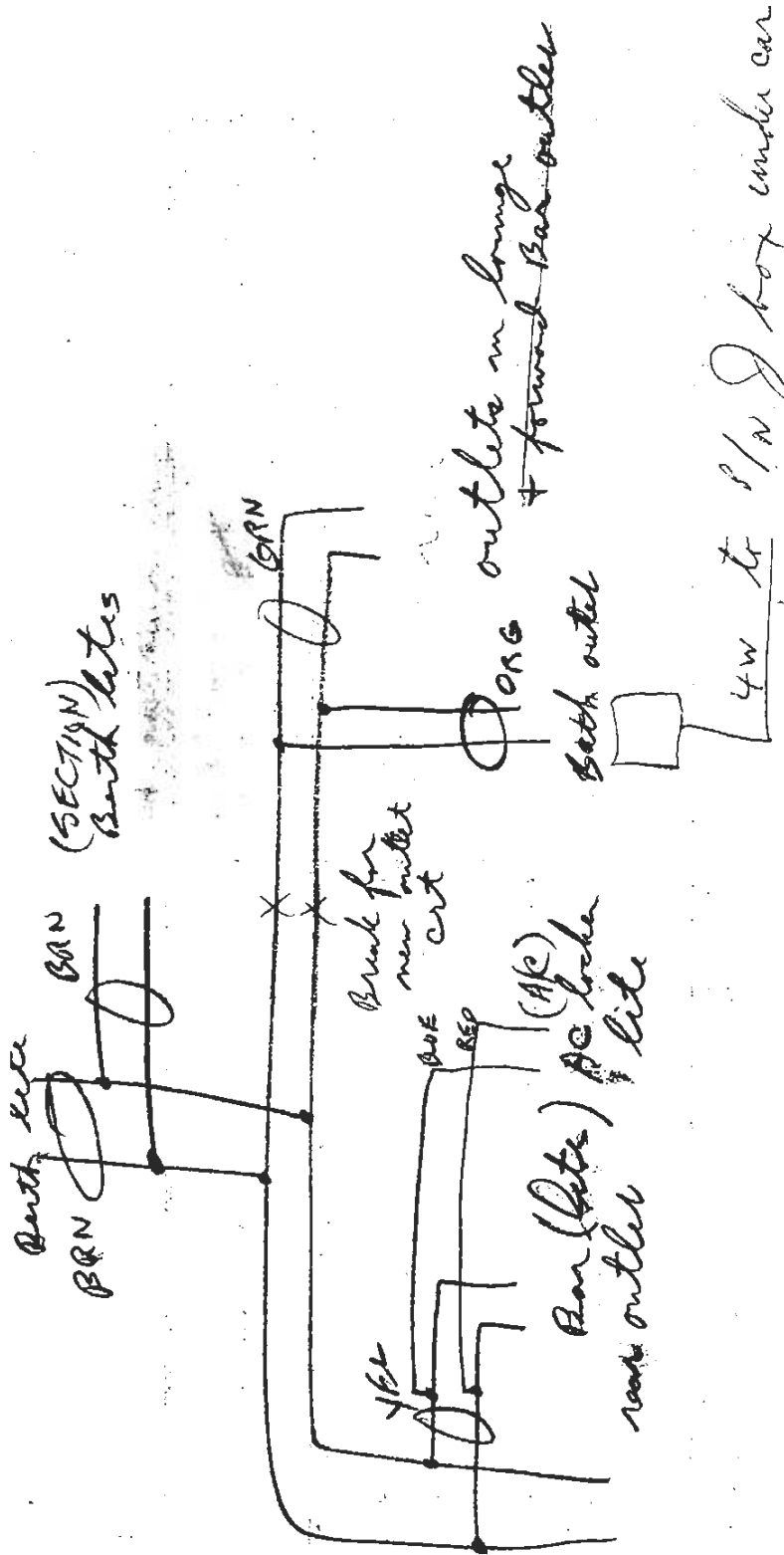
8/89



DECK LITES LOUNGE

FIG 12

CO# 5  
CO# 7



outlets in lounge  
+ forward Bath outlets

4w to S/W J box under car  
# 305, 306  
Cen Break  
A9

lites / outlet circuits

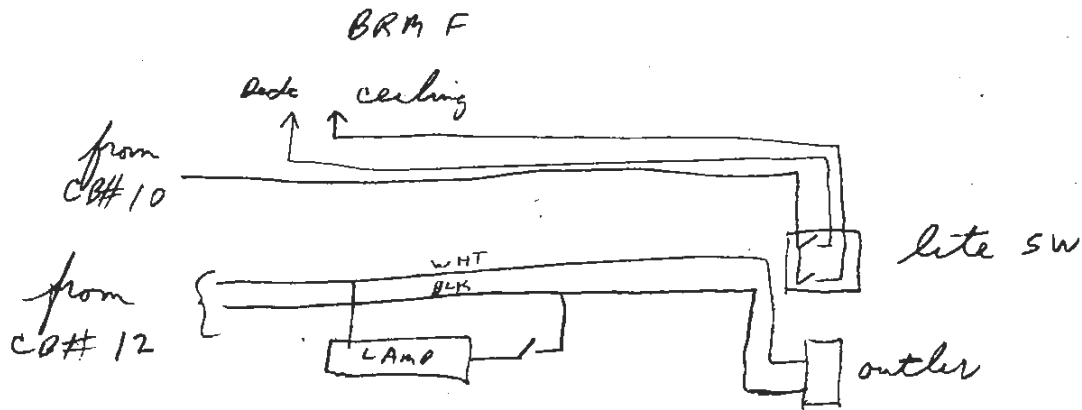
at J box in Bath ceiling  
over sink

Red-Black  
line  
CB #9

Fig 13

11/91

5/89  
Ram



Comboler wiring BRM F

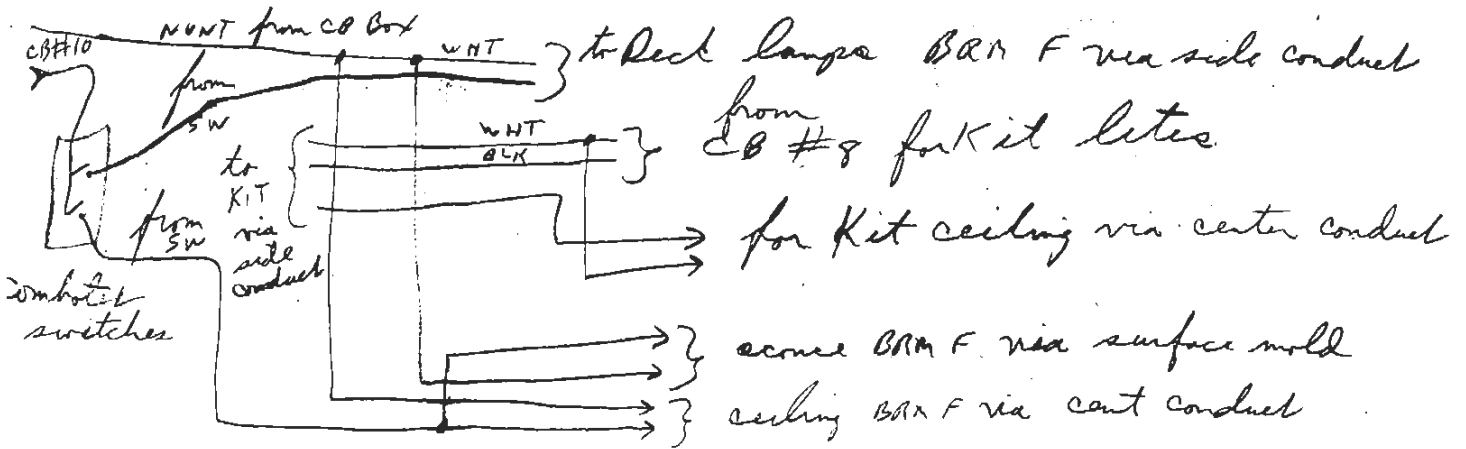


Fig 14 KIT wiring at main box + BRM F

SECTION SECTION

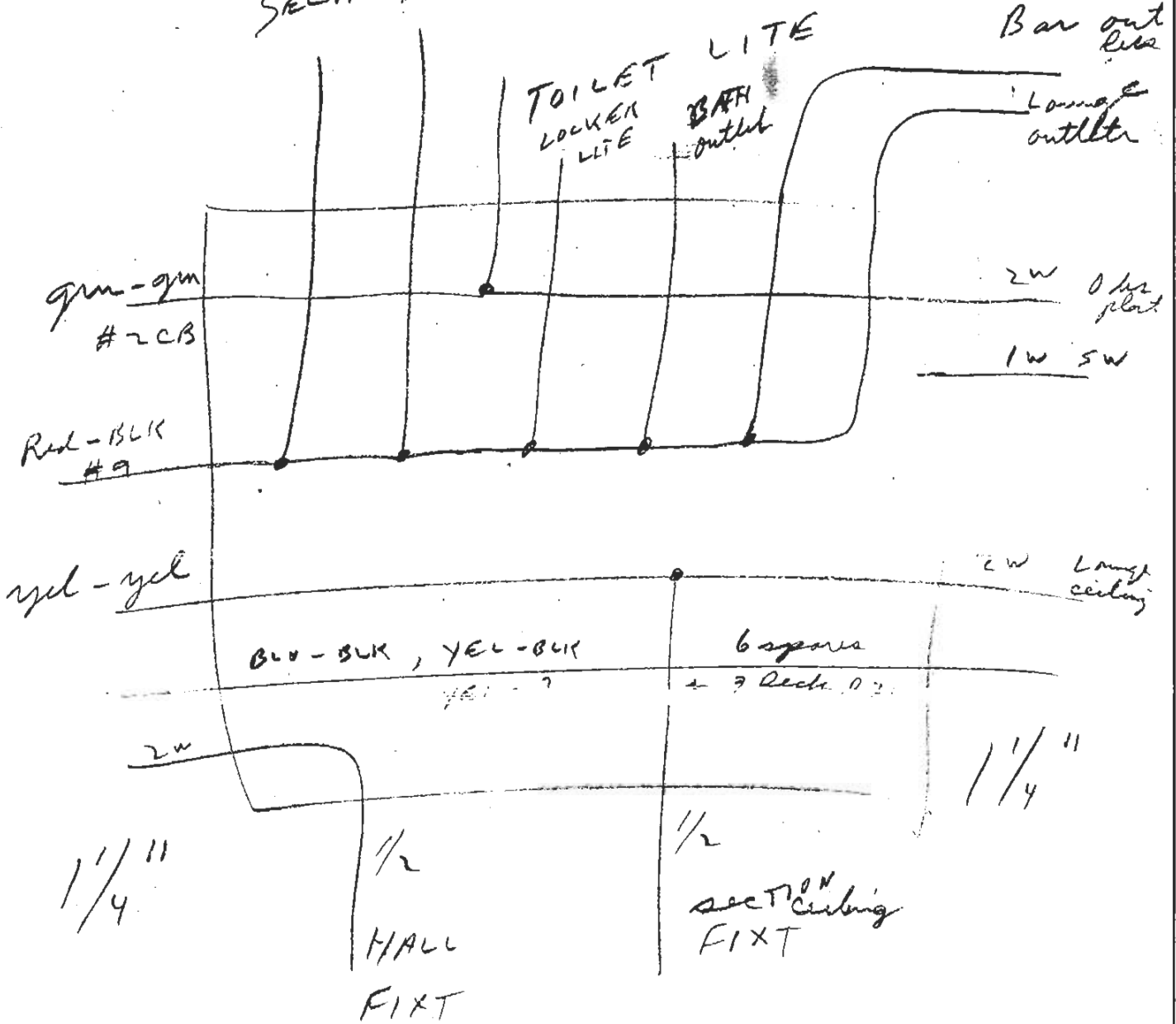


Fig 15

Bath box wiring

Ram  
6/97

TO MAIN J BOX VIA SIDE CONDUIT

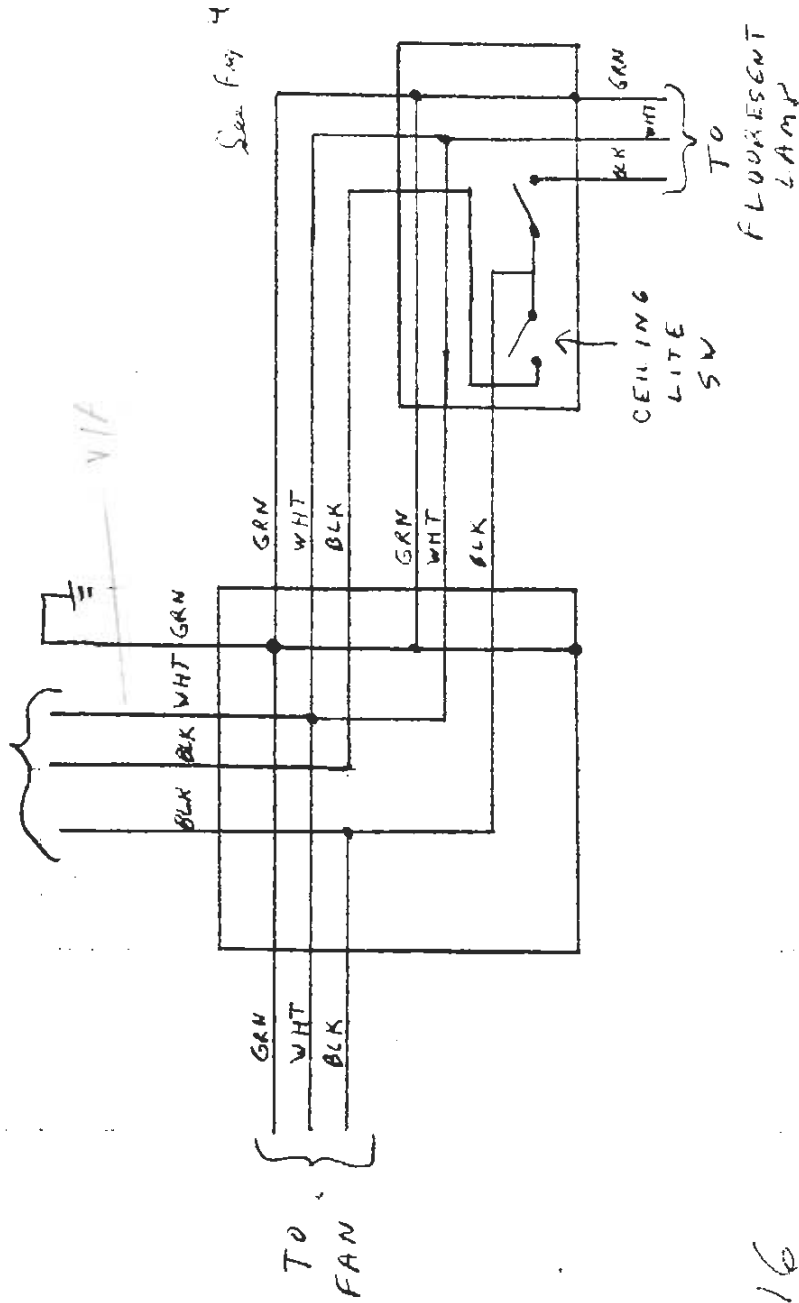


Fig 16

KIT WIRING OVER SINK

7/89  
Ran

# Stewards Panel

120 VOLT LIGHTING PANEL			
OFF	ON	ON	OFF
1	HALL	TOILET, MARKERS, OBS PLATFORM	2
3	LOUNGE SECTION CEILING CEILING	SHOWER, STEWARD	4
5	LOUNGE DECK	DUCT FAN	6
7	LOUNGE DECK	KIT, LOCKER CEILING	8
9	SECTION, BAR, LOUNGE OUTLETS	BEDROOMS	10
11	REFRIGERATOR ELEC LOCKER	BRM WASH STANDS & outlets	12

Fig 17



Fig 18



WATER COOLER  
LOCKER

RUSTED OUT BOTTOM

RESTORED AC  
LOCKER



**LA CONDESA**  
PRIVATE RAILROAD CAR

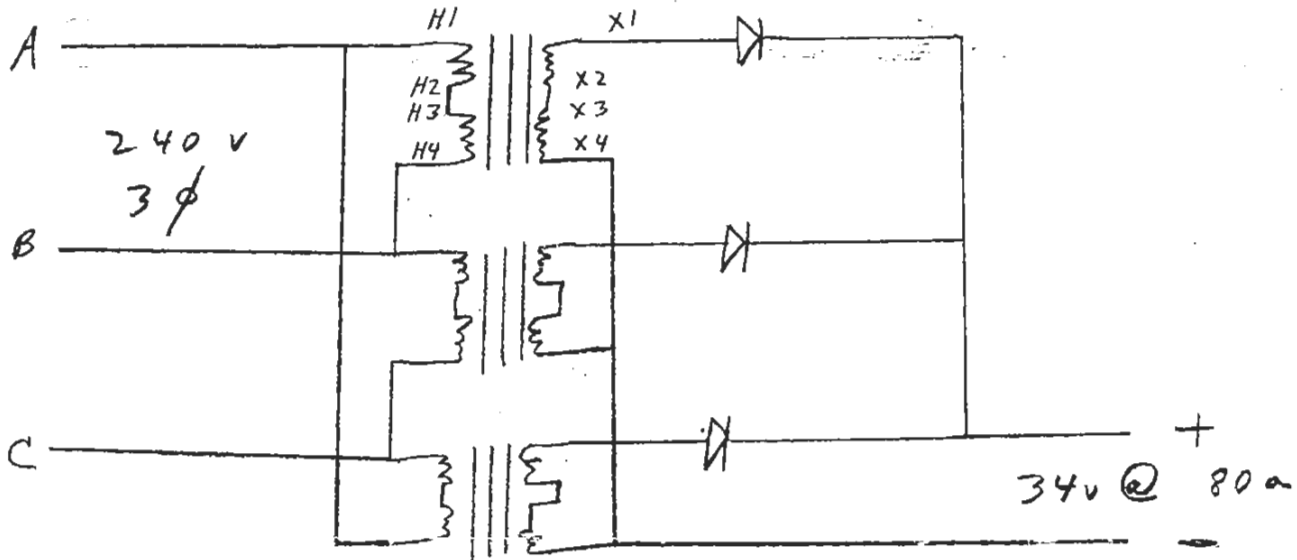
8/91

CROTHWAIT RAILCAR RENTAL  
969 SANTA YSABEL AVENUE  
BAYWOOD PARK, CA 93401

PH. (805) 528-1002



# 32V DC Converter



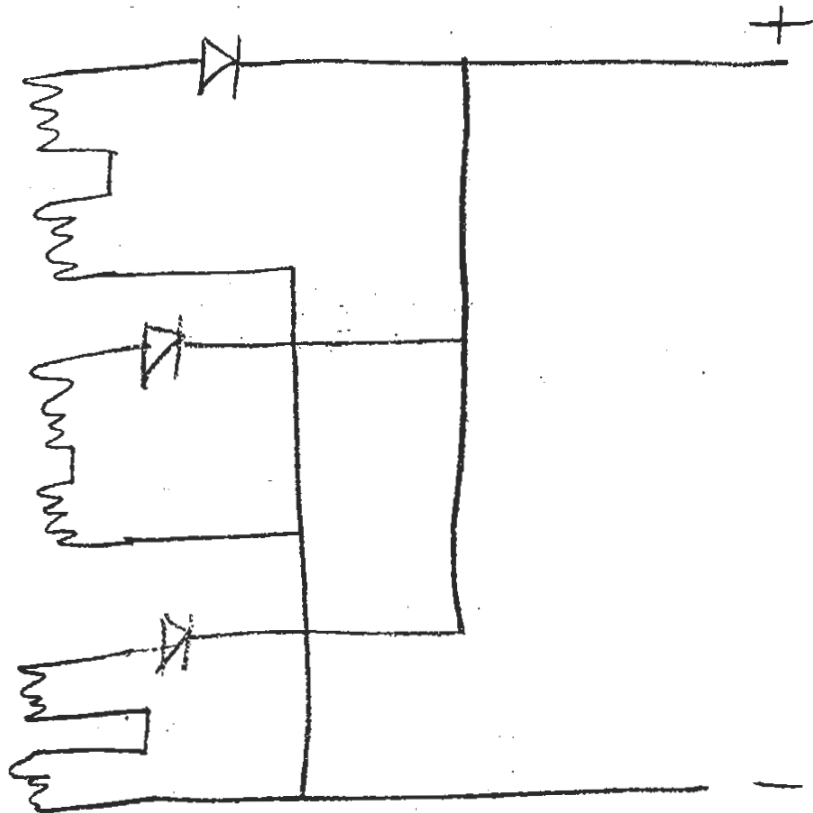
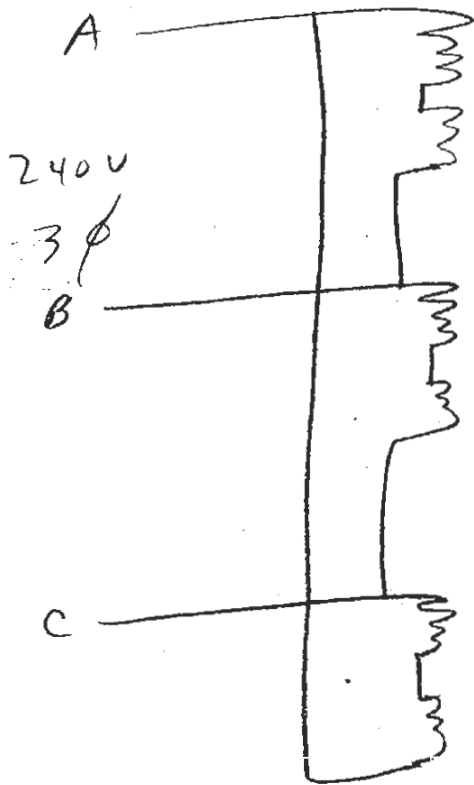
100a with  
2KVA trans

TRANS GE 9T51B131  
120/240 to 16/32  
@ 1500VA

DIODE NTE 6354 Mounted on heat  
300a 400v sink

Fig 19

Ram 6/94



$$32 \text{ V AC} = 81 \text{ V DC}$$

$$37.4 \text{ V DC}$$

$$I_D = .77 I_0$$

$$I_{AC} = .578 I_0$$

$$1.5 \text{ KVA} = 46.8 \text{ a} = .578 I_0 \quad I_0 = 81 \text{ a}$$

$$2.0 \text{ KVA} = 62.5 \text{ a} \quad \text{or} \quad I_0 = 108 \text{ a}$$

Ram 6/94

## Other Diodes

NTE 6154	150a	400V
NTE 6060	70a	400V
MUR 7020	70a	200V
1N3291A	100a	400V
70HF40	70a	400V
R 4140470	70a	400V
R 5100410	100a	400V

# INDUSTRIAL RECTIFIERS

PRV VOLTS	MAXIMUM AVERAGE RECTIFIED FORWARD CURRENT $I_F$ IN AMPERES											
	40A	50A	60A	70A	85A	150A	300A	450A	500A	550A	1200A	2200A
50	NTE5980		NTE6020	NTE6048								
50	NTE5981*		NTE6021*	NTE6049*								
100	NTE5982		NTE6022	NTE6050								
100	NTE5983*		NTE6023*	NTE6051*								
200	NTE5986		NTE6026	NTE6054	NTE6074							
200	NTE5987*		NTE6027*	NTE6055*	NTE6075*							
300	NTE5988		NTE6030	NTE6058								
300	NTE5989*		NTE6031*	NTE6059*								
400	NTE5990	NTE5826	NTE6034	NTE6060		NTE6154	NTE6354					
400	NTE5991*	NTE5827*	NTE6035*	NTE6061*		NTE6155*	NTE6355*					
500	NTE5992		NTE6038									
500	NTE5993*		NTE6039*									
600	NTE5994		NTE6040	NTE6064	NTE6076	NTE6156	NTE6356		NTE6110	NTE6102		NTE6116
600	NTE5995*		NTE6041*	NTE6065*	NTE6077*	NTE6157*	NTE6357*			NTE6103*	NTE6113	
800	NTE5998	NTE5828	NTE6042	NTE6068								
800	NTE5999*	NTE5829*	NTE6043*	NTE6069*								
1000	NTE6002		NTE6044	NTE6072		NTE6158	NTE6358					
1000	NTE6003*		NTE6045*	NTE6073*		NTE6159*	NTE6359*					
1200					NTE6078				NTE6112	NTE6104	NTE6115	NTE6118
1200					NTE6079*					NTE6105*		
1400						NTE6162	NTE6362					
1400						NTE6163*	NTE6363*					
1600								NTE6106				
1600								NTE6107*				
$I_{FM}$ Surge	500 A	600 A	700 A	1200 A	1500 A	2100 A	5000 A	8500 A	6500 A	10,000 A	12,500 A	30,000 A
$V_F$ @ Rated $I_F$	1.2 V Max 1 V Typ	1 V Max .95 V Typ	1.4 V Max 1 V Typ	1.27 V Max .95 V Typ	1.45 V Max 1.1 V Typ	1.2 V Max 1 V Typ	1.4 V Max 1.2 V Typ	1.6 V Max	1.4 V Max	1.2 V Max	1.2 V Max	1.1 V Max
$T_C$ at Rated $I_F$ ( $^{\circ}C$ ) Max	+150	+150	+150	+150	+120	+130	+130	+120		+125	+105	+130
Diag No.	64	120	64	64	64	122	123	390	389	390	388	387
Case Style	DO5	Press Fit	DO5	DO5	DO5	DO8	DO9	—	Hockey Puck	—	Hockey Puck	Hockey Puck

NOTE: Cathod to case is standard polarity.  
\* Indicates anode to case polarity.

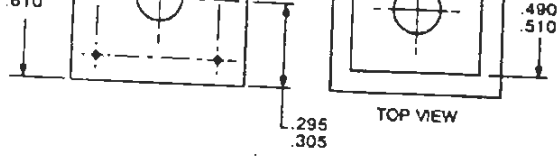


Diagram 121

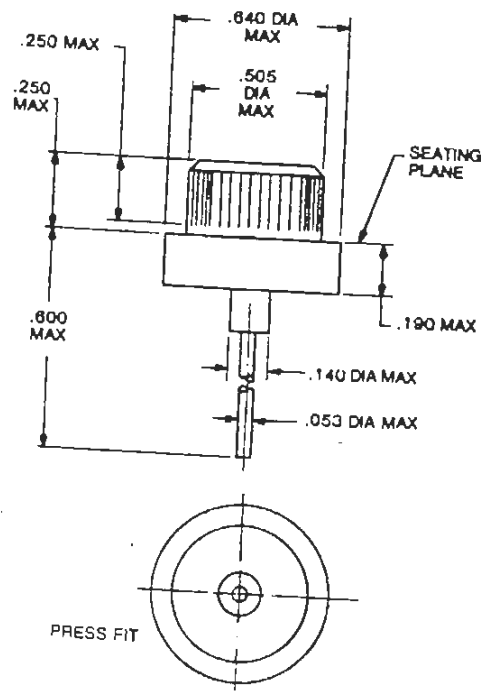
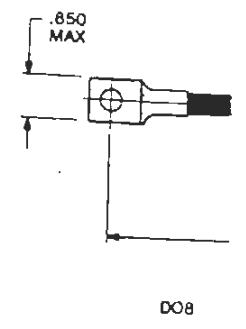


Diagram 122



DO8

Diagram 123

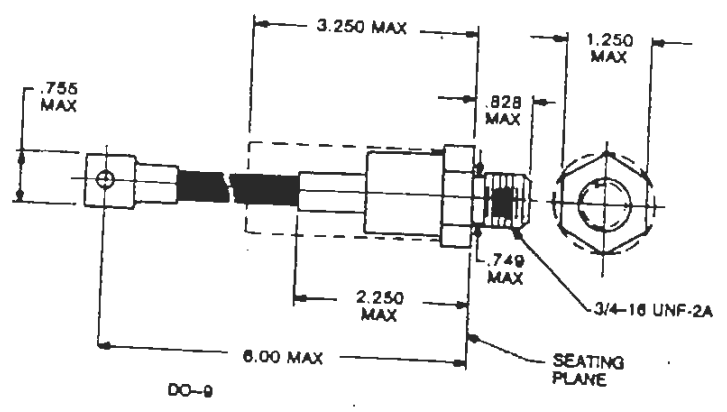
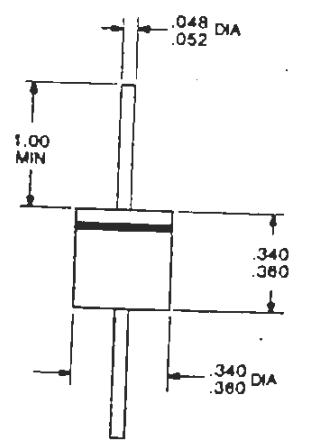
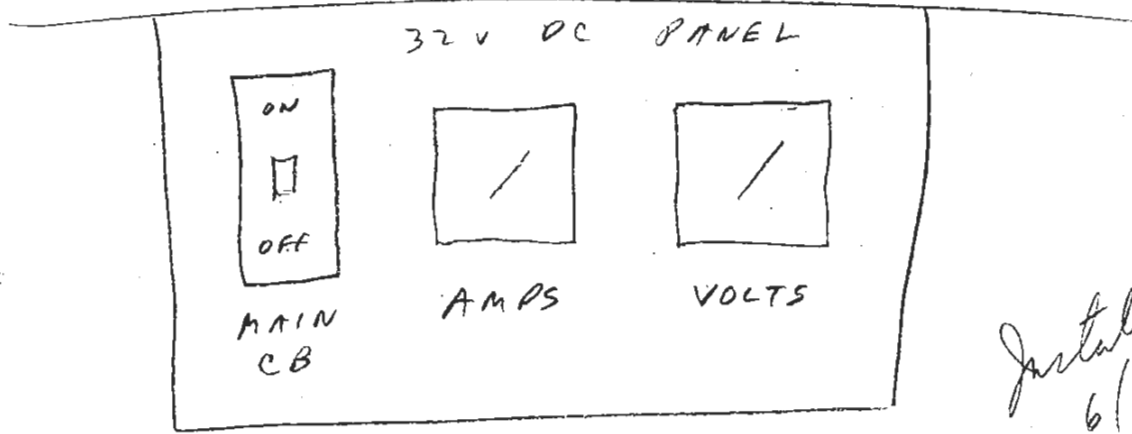


Diagram 351



# Proposed 32v DC Panel



Installed  
6/91

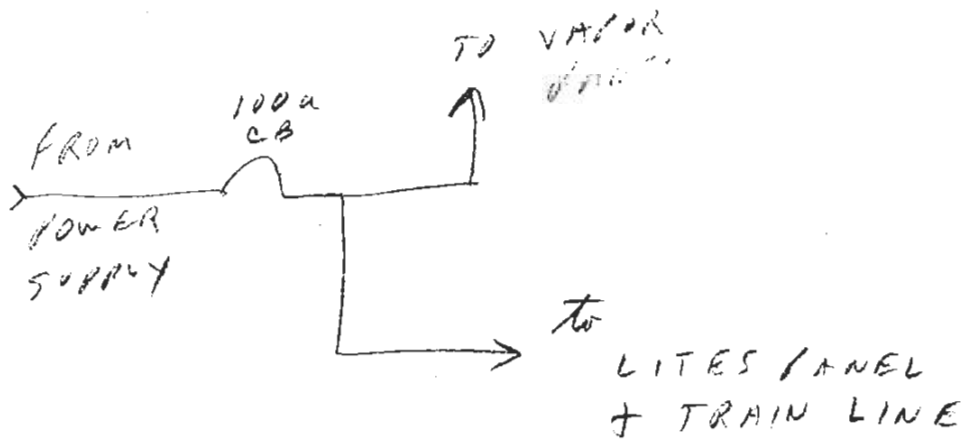


FIG 20

Ram  
5/91

# 32V DC System

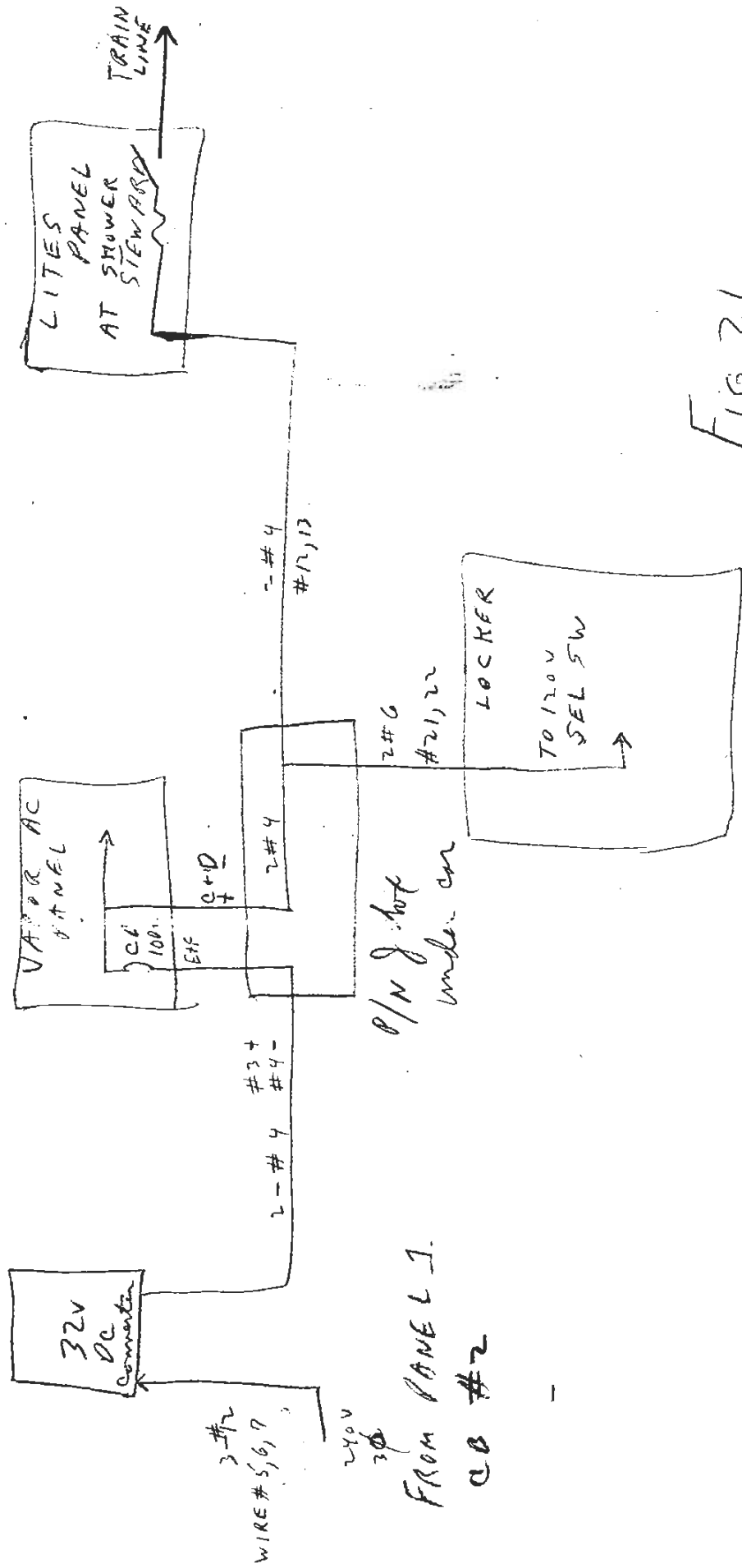


FIG 21

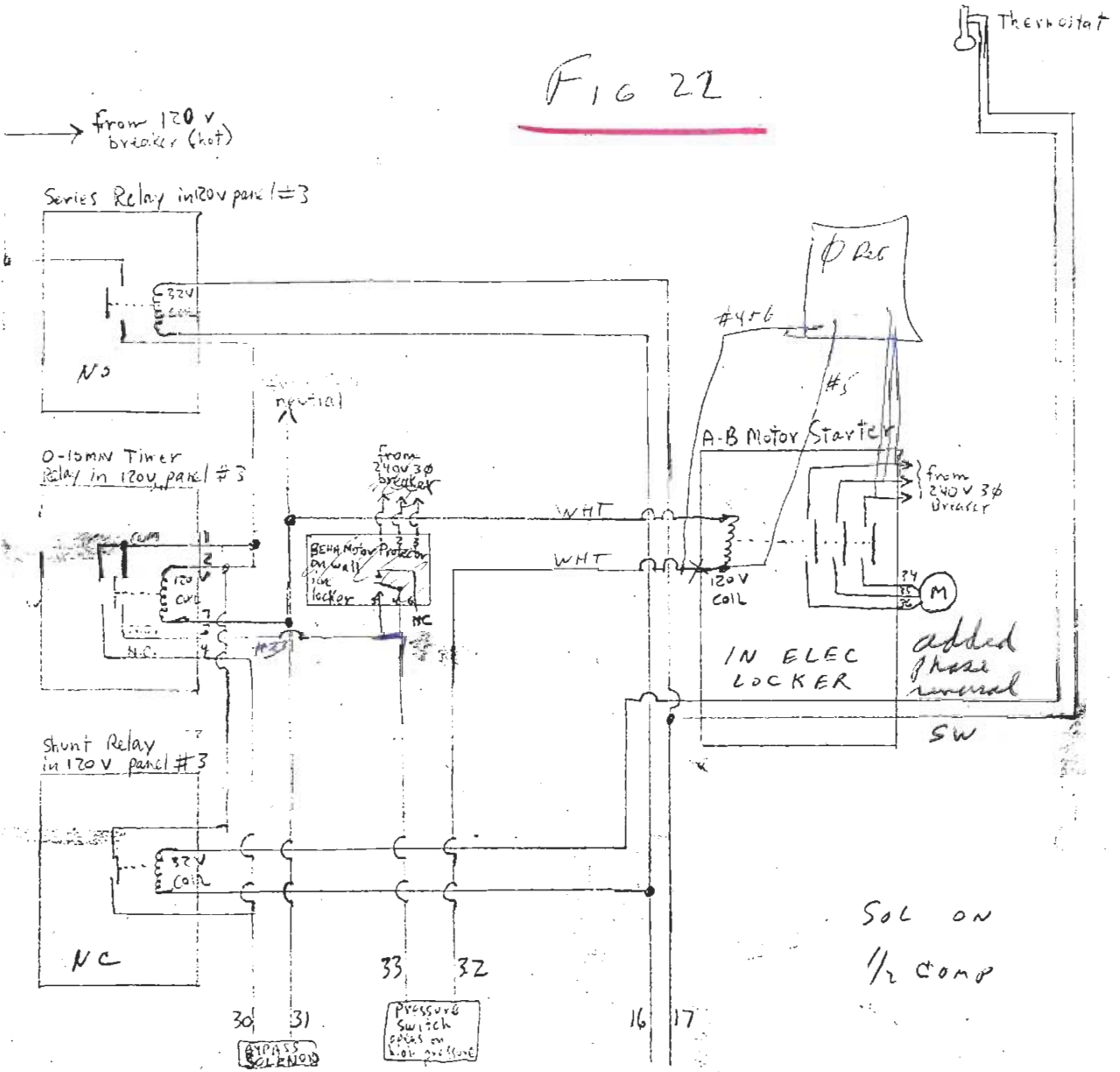




# AIR CONDITIONING CONTROL

REVISED  
6/27/86 B.F.  
7/22/88 B.F.

FIG 22



SOL ON  
1/2 COMP

32 vdc from vapor panel to terminals #

re shaping the way industry thinks.

And works.



FIG 23  
AC CONDENSER UNIT



SHEET METAL WORK  
UPPER BERTH BRM A  
FIG 24



FIG 25



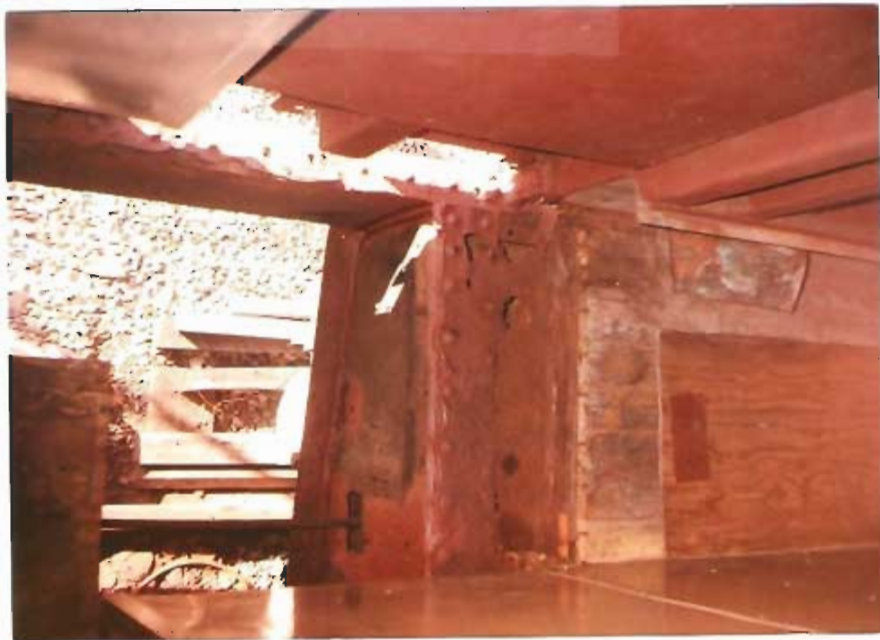


FIG 26



HALLWAY  
UNDER OLD  
ICE BOX

→  
AT STEWARD'S  
LOCATION



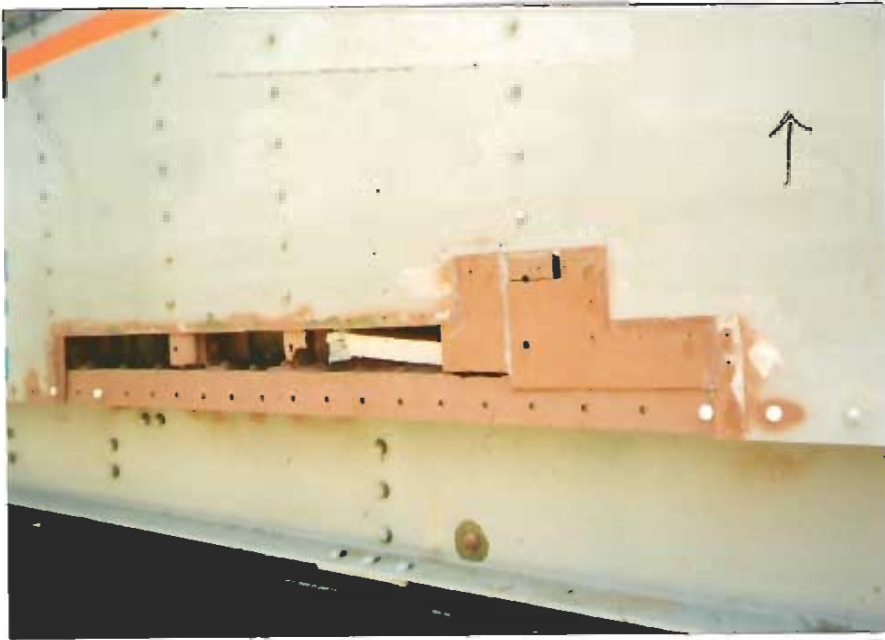
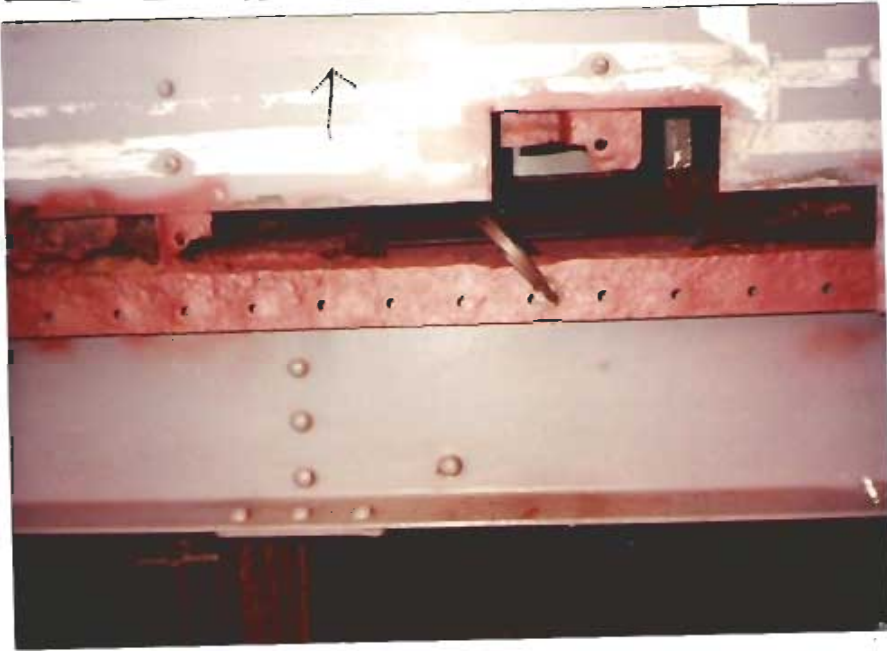


FIG 27

SIDE SHEET  
REPAIR



UNDER OLD  
ICE BOX



FIG 28



RUST  
OUT AT  
BRM C





INTERIOR  
WALL  
REPAIR



FIG 29







← HALLWAY

FORWARD  
HALLWAY  
REPAIR

← BARM  
A

FIG 30



← FORWARD  
DOOR

← NEW STEEL JAM.



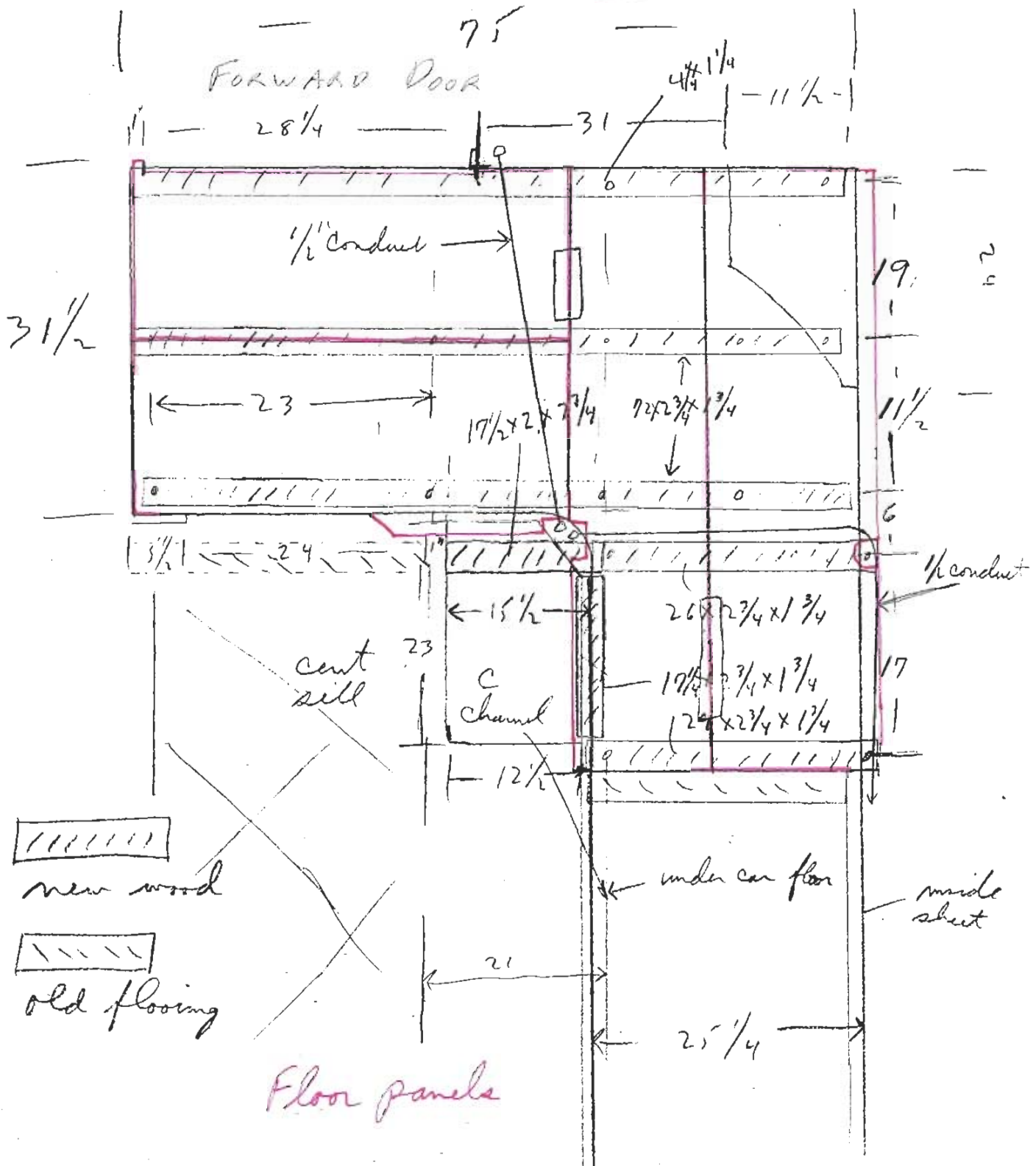


FORWARD  
HALLWAY

FIG 31

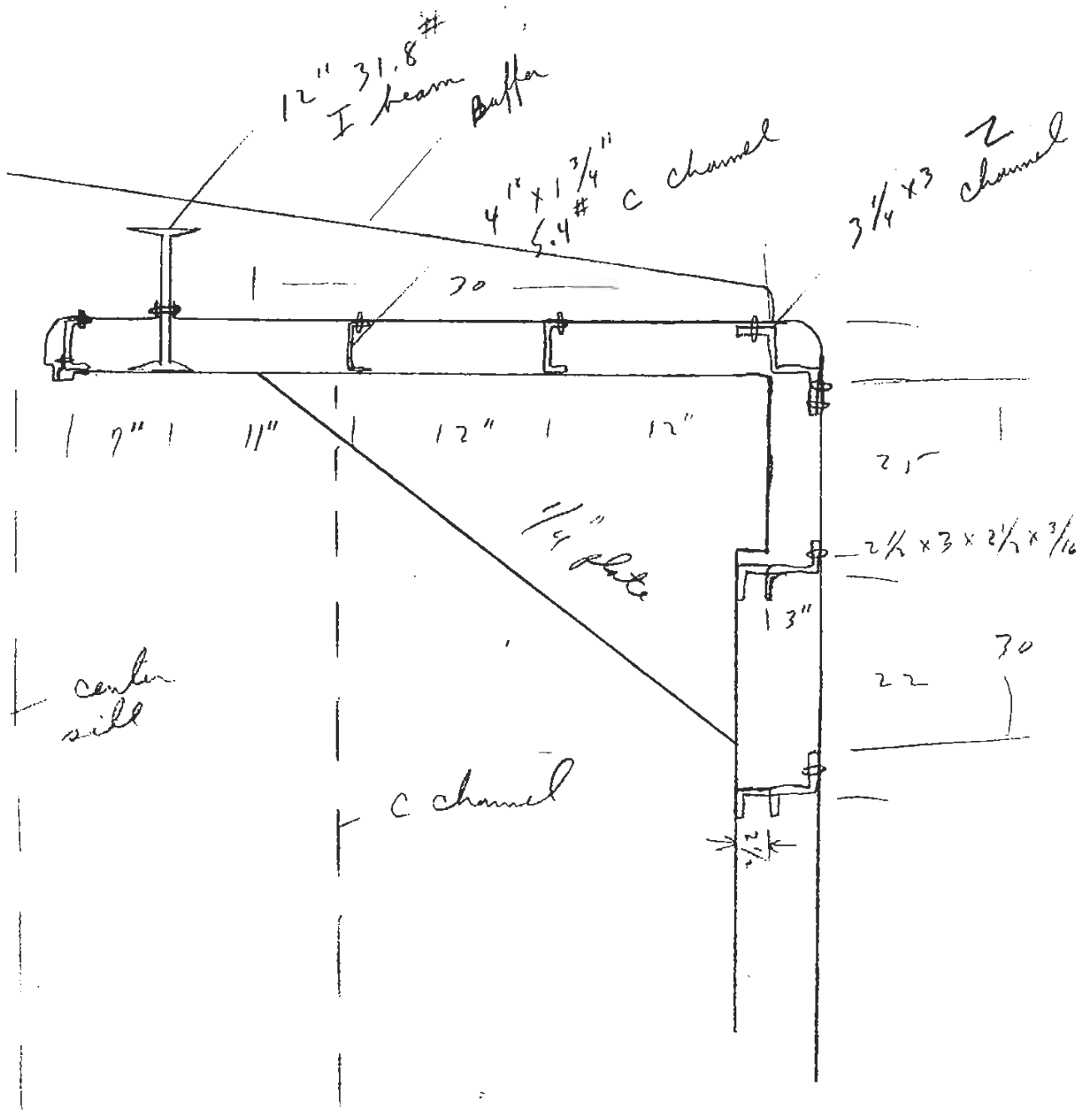


FIG 31 A



Rear Hallway floor spacing  
FORWARD

From  
1/92

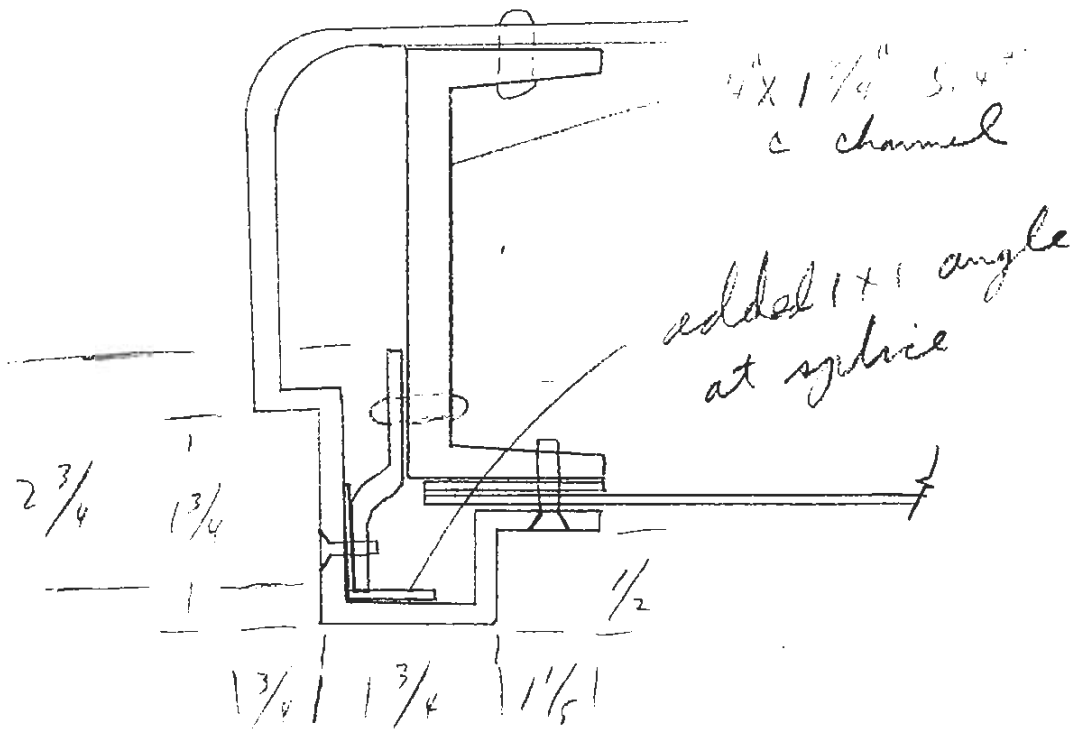


Rear Corner

TOP VIEW

Plan 1/92

Fig 32

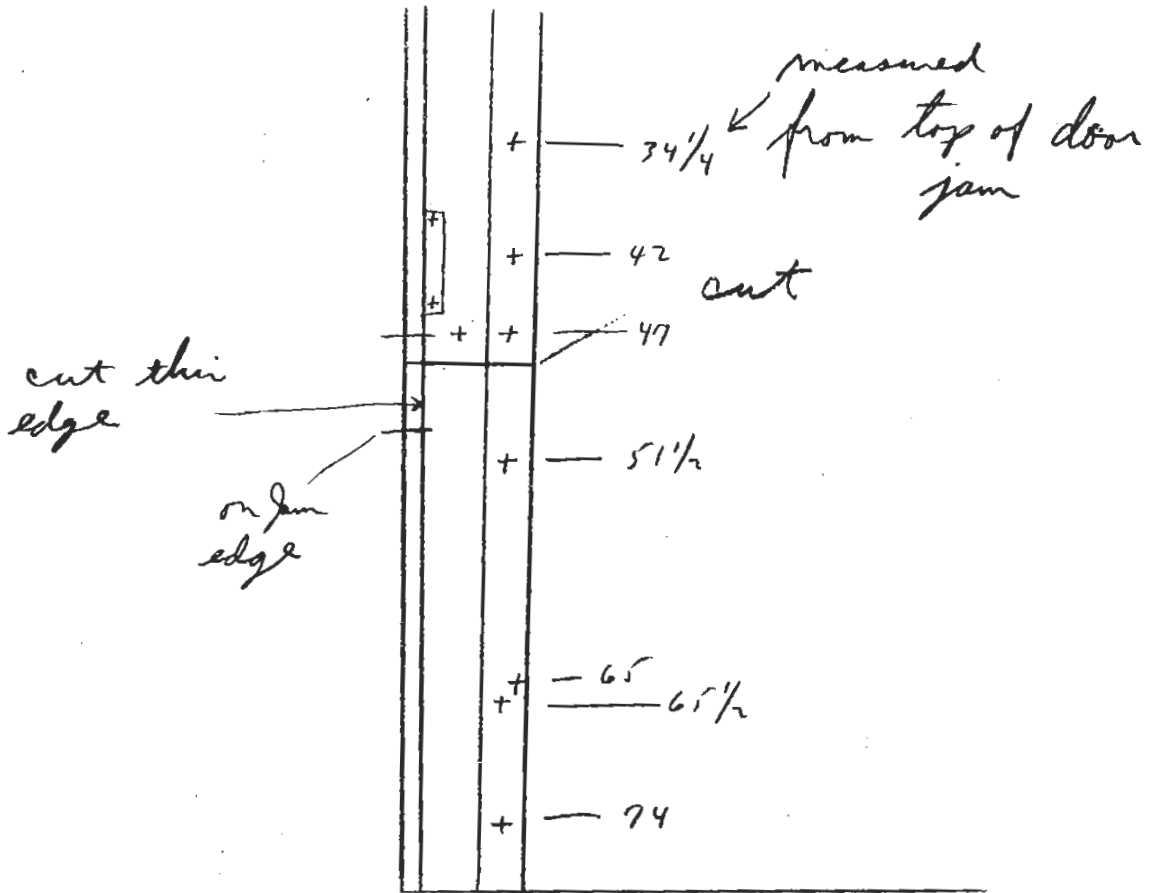


section at front/KIT  
door jamb

TOP VIEW

Ram  
7/10

Fig 32 A



Edge view front door <sup>KIT</sup>  
screw hole location

Pram  
2/92

BRM 2

SHOWER



FIG 33

NEW FLOORING





FIG 34  
OLD  
ICE HATCH





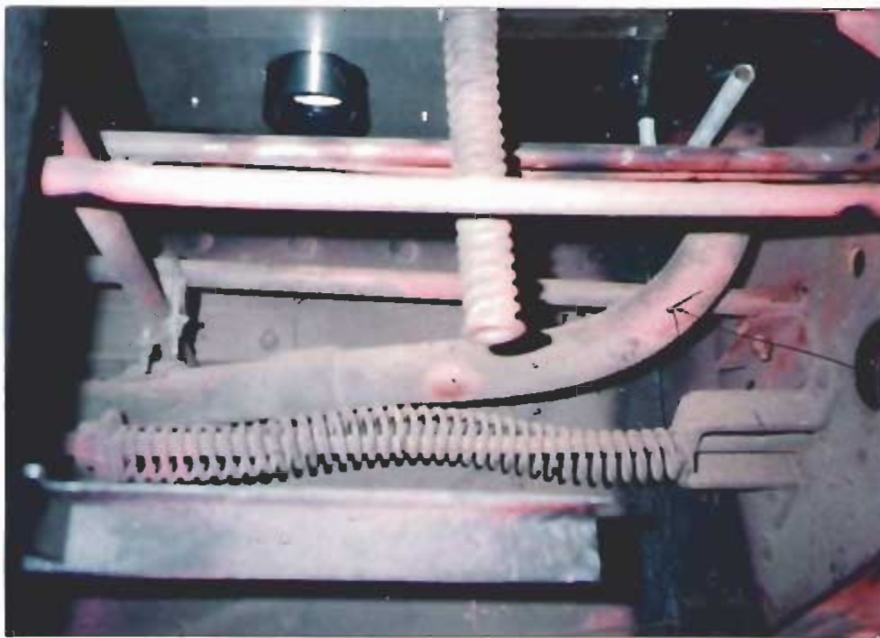
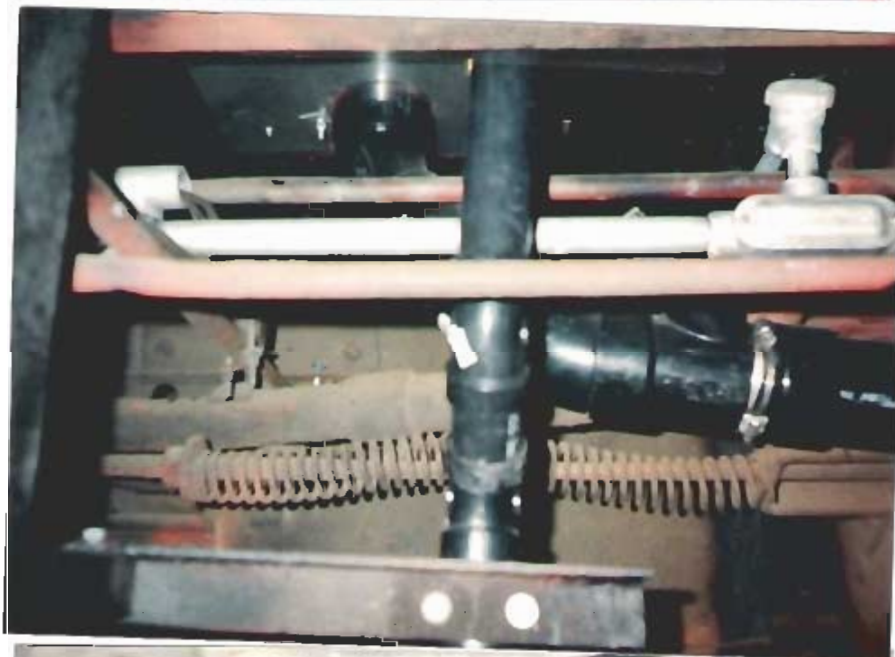


FIG 35

← MAIN ELECTRICAL  
CONDUIT TO  
STWARDS LOCKER

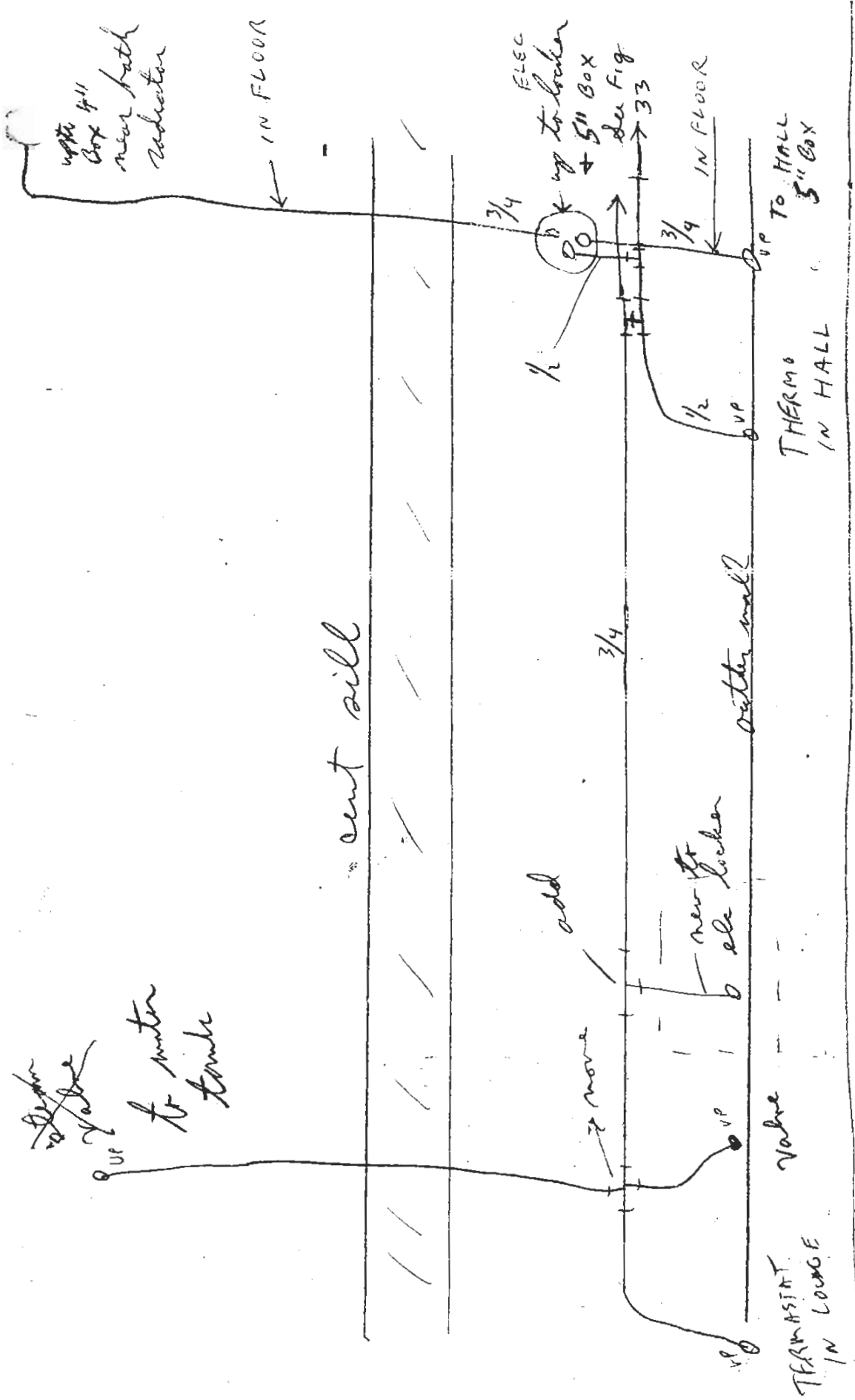


← NEW CONDUIT

← TOILET DRAIN



← SINK DRAIN



New AC heater + vented line

under car

FIG 36

10/93



FIG 37

← CONDUIT TO OPPOSITE  
SIDE OF CAR

HALL, SIDE SHEET  
+ PIER PANEL  
REPAIR





FIG 38

KIT



TOP VIEW

1/2" Conduit TO FORWARD HALL FOR END RADS + other

1/2" Conduit FROM KIT. RAD + LOCKER KIT

OUTSIDE WALL

HALL RAD 4tv 1000W

HANDY BOX

DOWN UNDER FLOOR

3/4" V to 5" BOX AT ~~BATH~~

~~RAD~~ STEWARD'S LOCKER

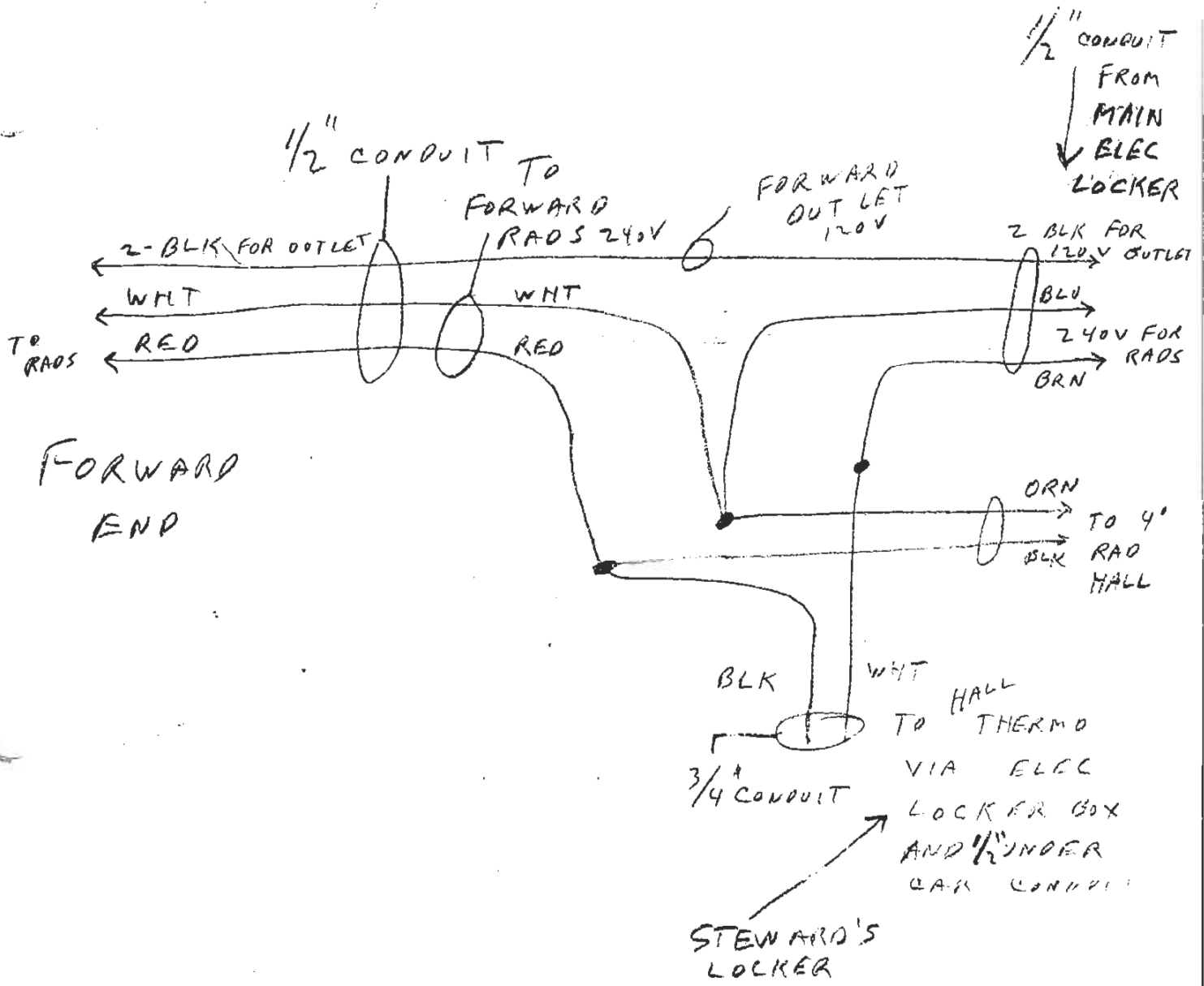
5" BOX

Plus 1/2" Conduit for Bells, tele, etc

FIG 39

HALL ELEC BOXES  
IN RAD HOUSING  
AT OLD ICE BOX  
LOCATION

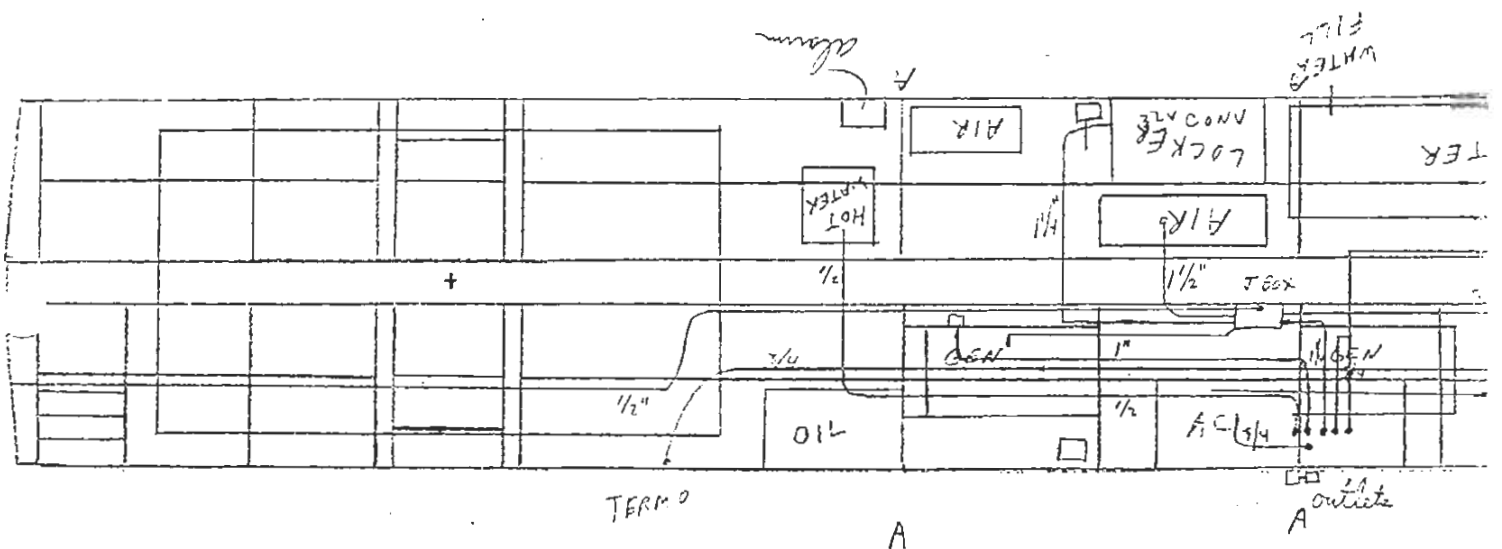
RAD  
2/95



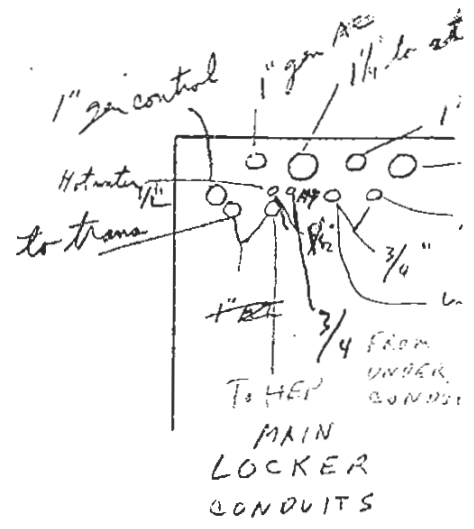
HALL ELEC WIRING  
AT OLD ICE BOX

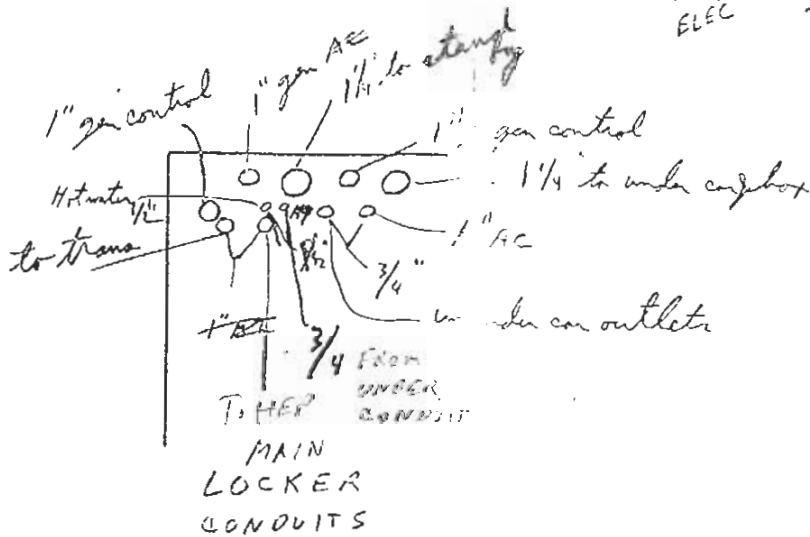
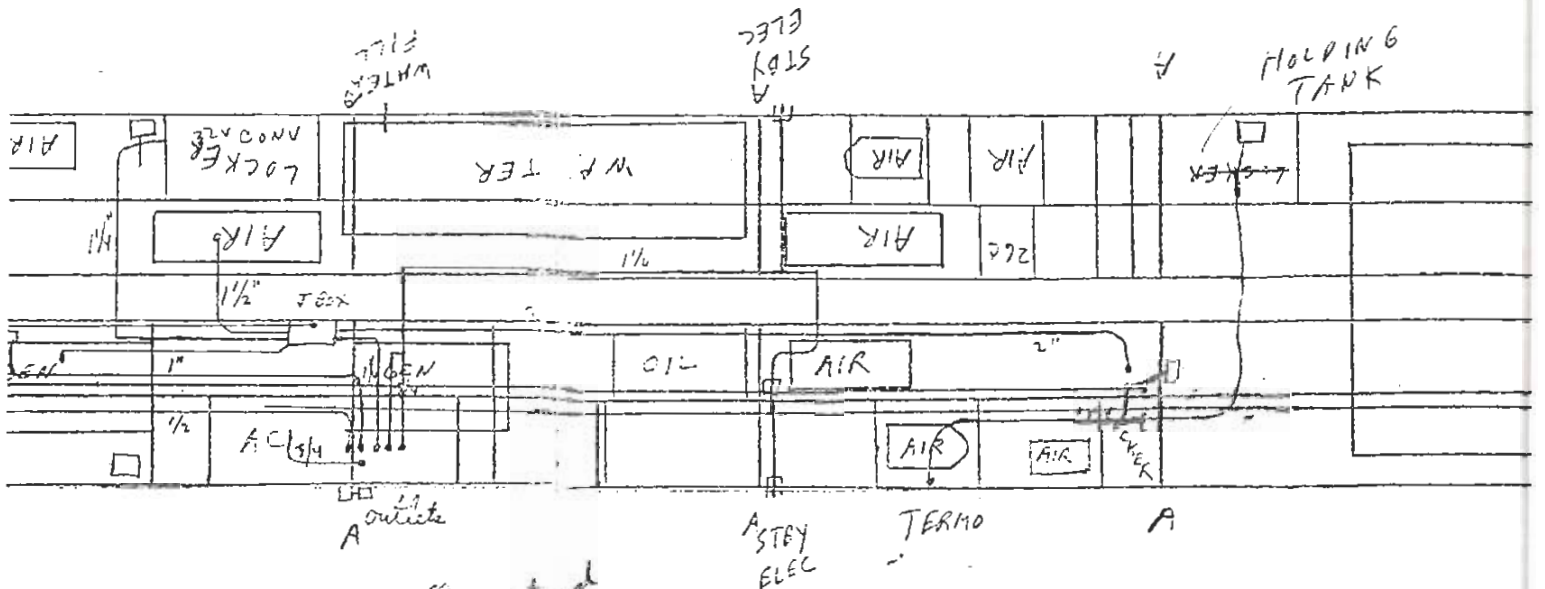
FIG 39A

RAM  
2/95



A = deep rib





Pyle Material (P/N)

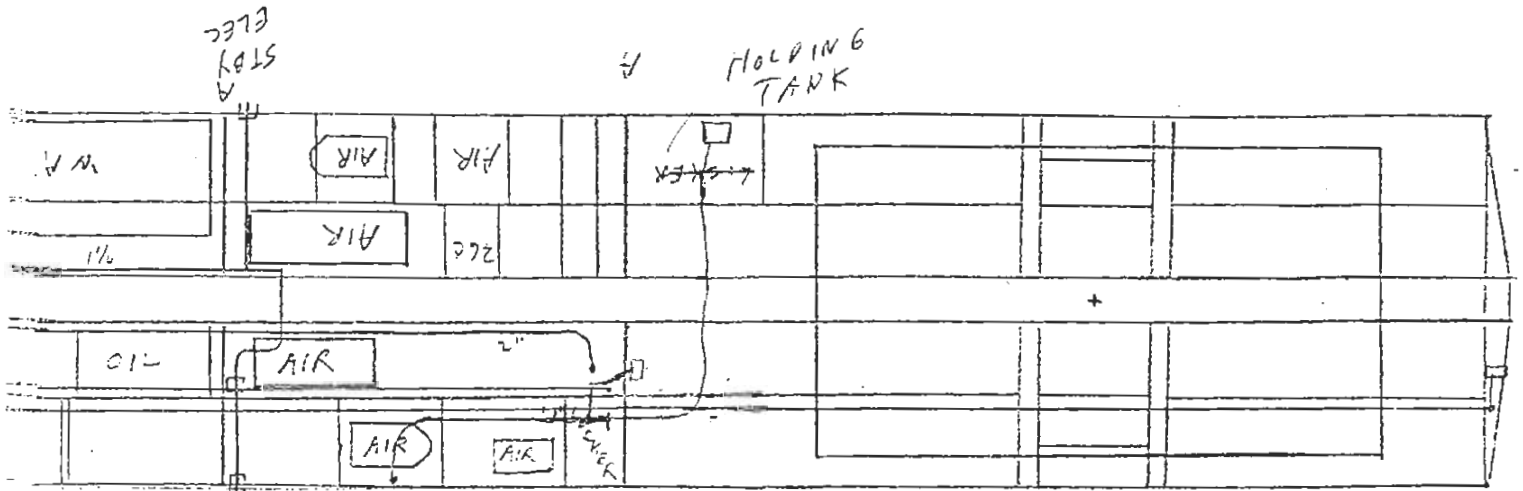
# 1512

Under car conduit

FIG 40



5/4 = 1"



1/4  
 2/2  
 2"  
 1/4  
 1" AC  
 under car outlets

gen control  
 1/4 to under engine  
 Pyrite Material (P/N)

# 1512

Under car conduct layout

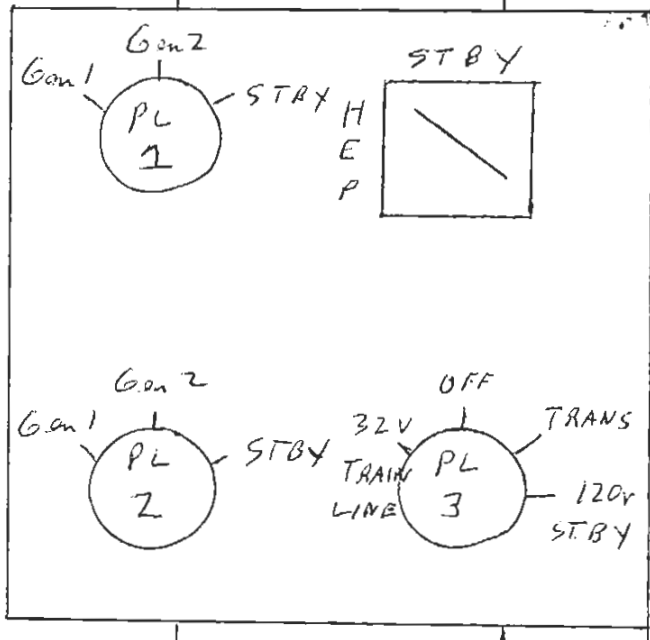
FIG 40

Ram  
 11/90

CB  
PANEL  
1

MAIN  
ELEC  
LOCKER

CB  
PANEL  
2

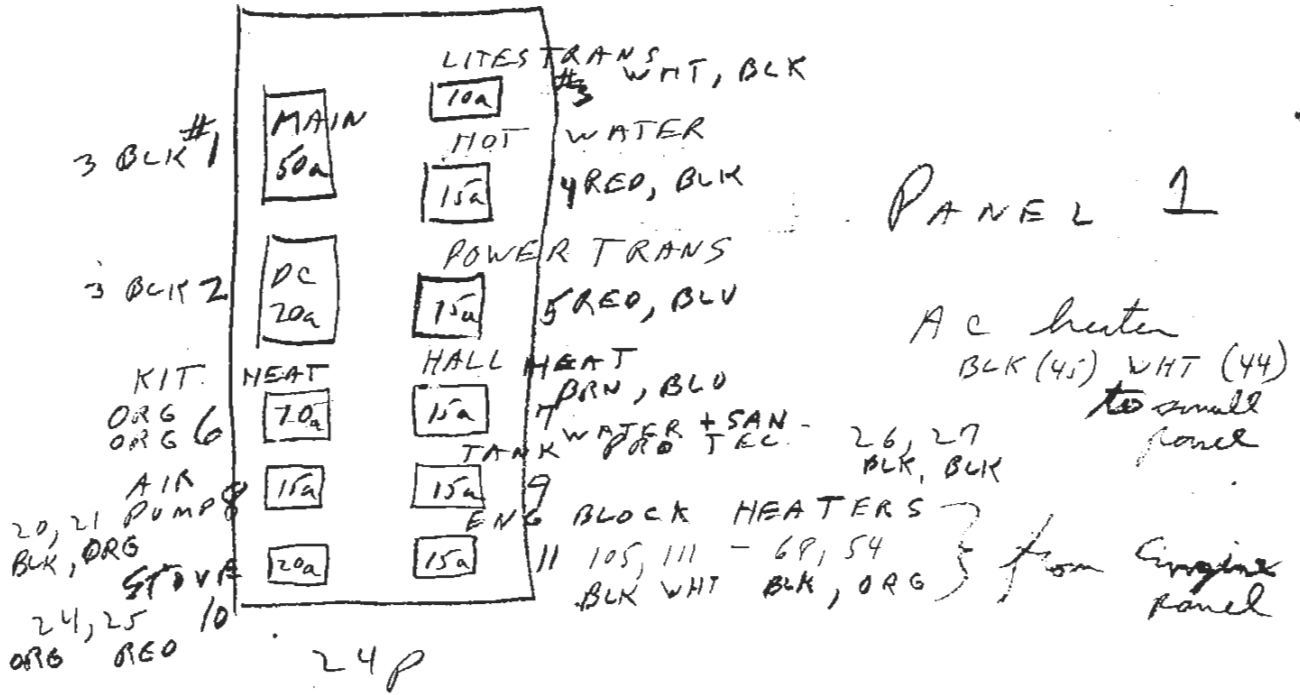


CB  
PANEL  
3

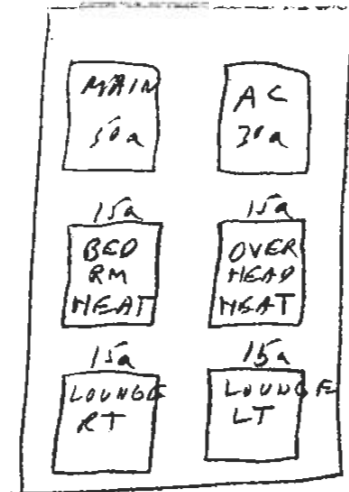
FIG 41

# CB panels

## LITE/ABP



## HEAT/AC



18P

## PANEL 2

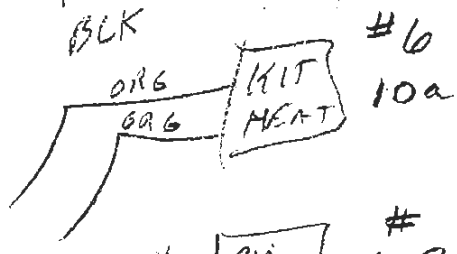
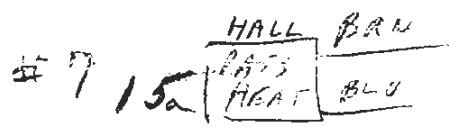
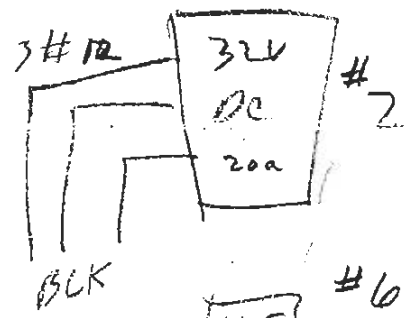
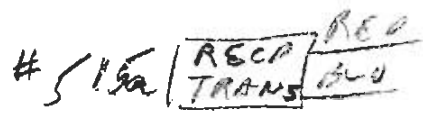
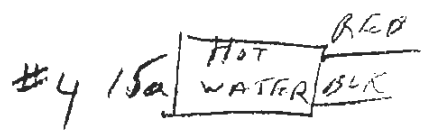
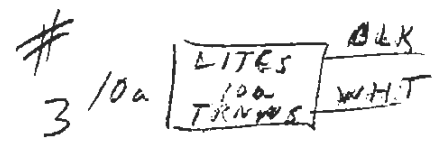
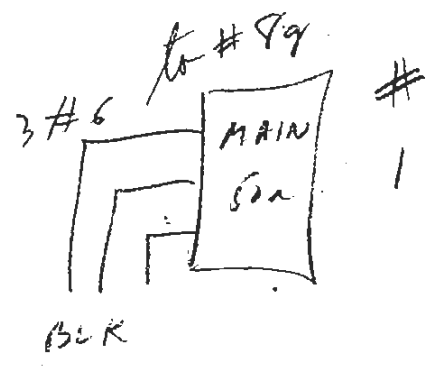
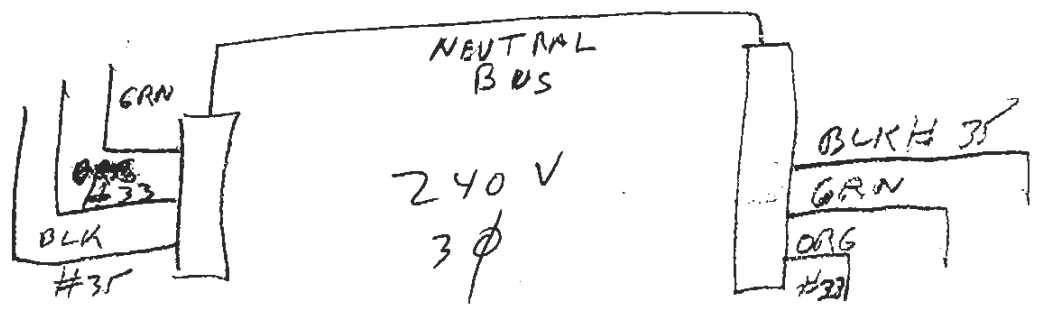
Split Buses.  
 Bottom via Lounge  
 Heat Relay controlled  
 from Lounge thermostat

FIG 41A

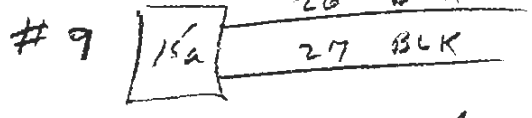
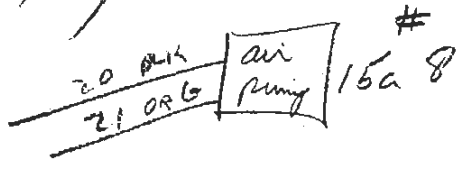
# Top CB PANEL #2 ar of

Owning

10/97  
9/98



Water + SAN FREEZE tank protection  
26 BLK



Eng Block heaters

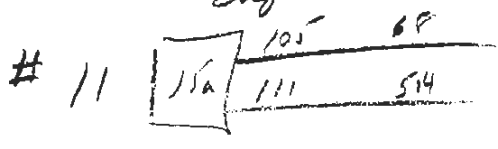
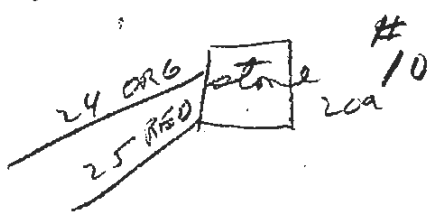


FIG 41B

# 120 V Circuits + wire #

- B1 15a Locker <sup>Locker</sup> lite #16 + outlet #27  
<sub>nut #18</sub> <sub>nut #17</sub>
- B2 50a O Man lite panel #24, nut #23  
at stowage locker
- B11 15a AC control + Heat  
#7 #24
- B12 10a O bs platform outlet #304, nut #305  
<sub>+ track liter</sub>
- A3 15a lounge outlets (Hallside) #5, nut #4
- A4 30a Under car outlet #43, nut #42
- A5 15a lounge outlets (Bath side) #305, nut #306
- A6 15a Forward hall outlet #25, nut #
- A7 10a Kit ~~table~~ outlet #44, nut #45  
<sub>07</sub> <sub>whit</sub>
- A8 15a Bedroom outlets #45 (BLK), nut #32  
<sub>whit</sub>
- A9 15a Bath + lounge outlets #305 BLK, nut 306  
<sub>whit/blk</sub>
- A10 15a Kit outlets #42, nut #37  
<sub>blk</sub> <sub>Red</sub>

- A power trans 3 KVA
- B lite trans 2 KVA

FIG 42

# 120 V CB BOX

locker outlets + lite #27 #26	B1	<del>B</del>	B2	main to stewards panel #24
Lounge outlets #5	3	A	4	under car outlets #43
Lounge outlets #305	5	A	6	forward hall outlets #25
Kit table outlets #44	7	A	8	Bedroom outlets #45
Bath outlets #305	9	A	10	Kitchen outlets #42
AC + Heat control #7 #24	B11	<del>B</del>	B12	OBS platform outlets and track lites #304

B CBs are on lites transformer 2 KVA  
 A CBs are on power " 3 KVA

Fig 42A

Ram  
4/99

Lighting STEWARD'S Q B  
 at Fused (CB) box PANEL

FUSE

TO

Red - Blk

# 9

Bar, berth +  
outlets

yel w  
has splice at AC unit

spare

OBS - plot

yel - BLK

spare

" "

grn - grn

# 4 2

Bath J box  
toilet, mirror, obs  
near ceiling - lounge  
+ ceiling berth

yel - yel

# 10 3

BLU - BLK  
has splice at AC unit

spare

obs plot

Red - yel

120 v Transformers  
Wiring

2 KVA Trans

BLK - WHT 14g  
Pri 240v

Blk #35  
~~ORAN~~ - YEL #34 12g  
Sec 120v

3 KVA Trans

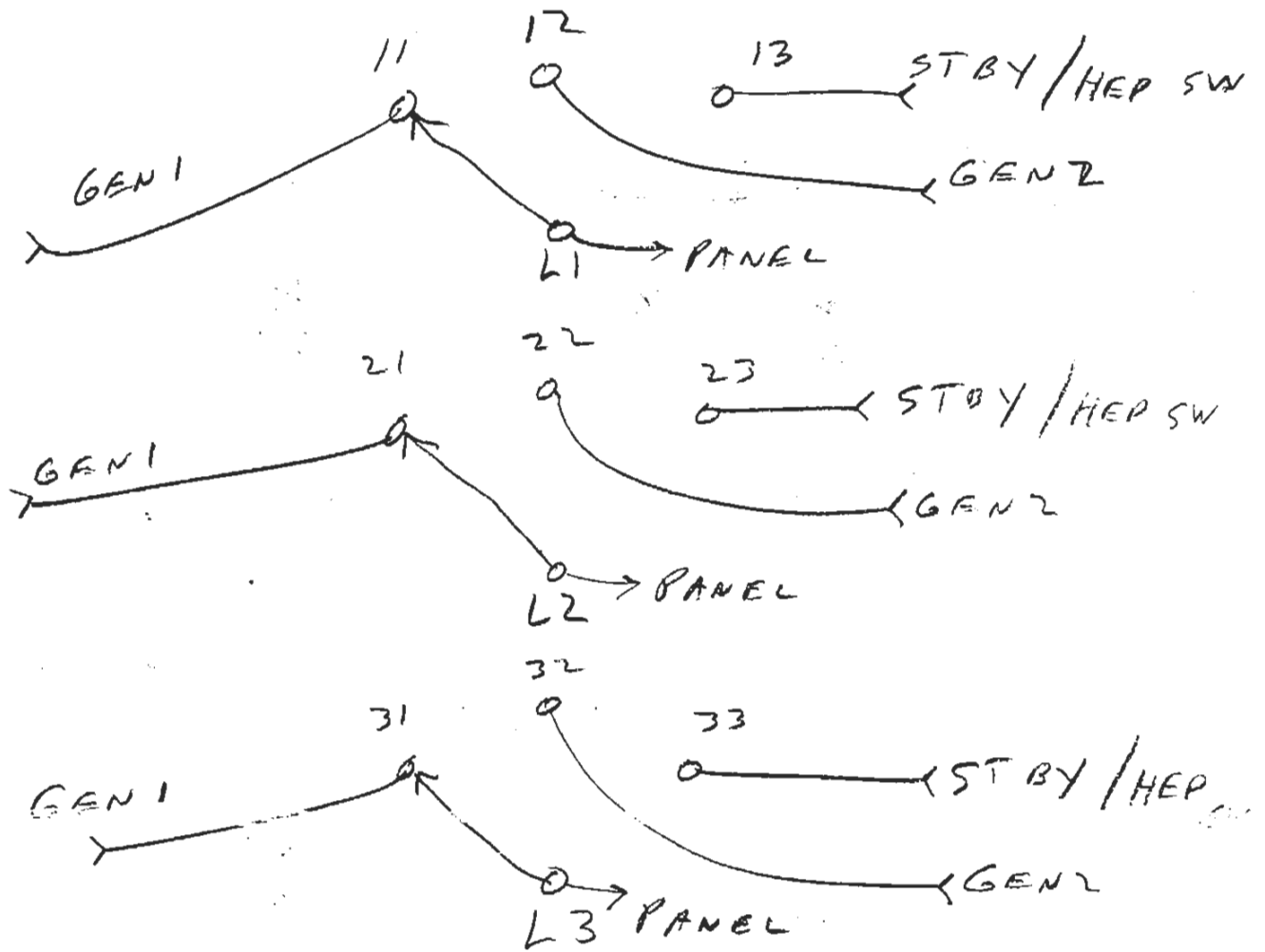
BLU - RED 14g  
Pri 240v

OR6 #33  
BLK - RED #36 10g  
Sec 120v

Ram  
1/96



# PANEL / GEN SWITCHES

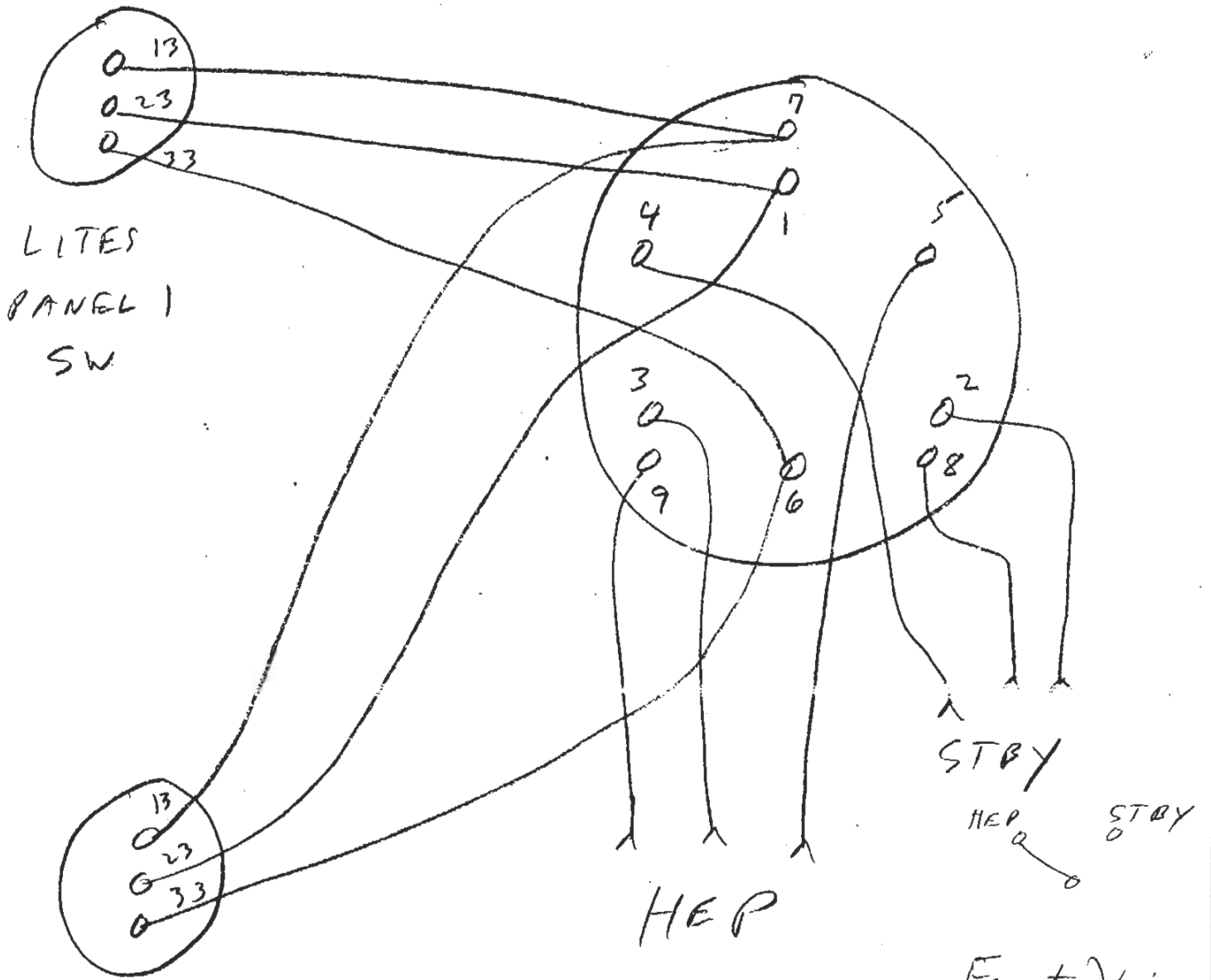


L3	33
	31 32
L2	21 22
	13 23
L1	11 12

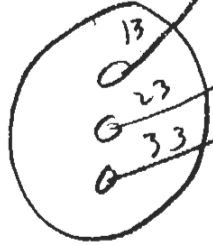
Panel Selec  
SW  
5 segments

FIG 43

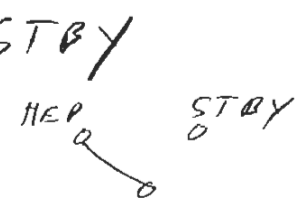
Ram  
8/98



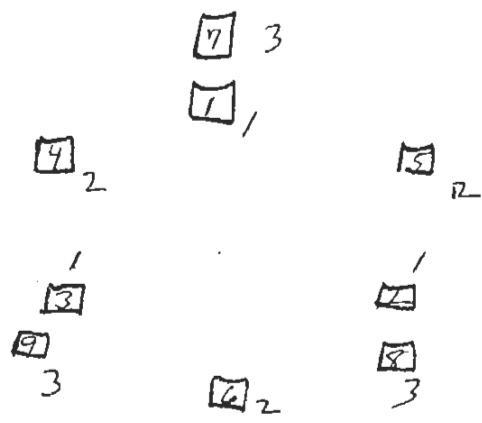
LITES  
PANEL 1  
SW



HEAT/AC  
PANEL 2  
SW



Front View



GANG/PECK  
POSITION

FIG 44

Ram  
8/98

HEP / STBY SW

HEP

to Panel  
SW

STBY

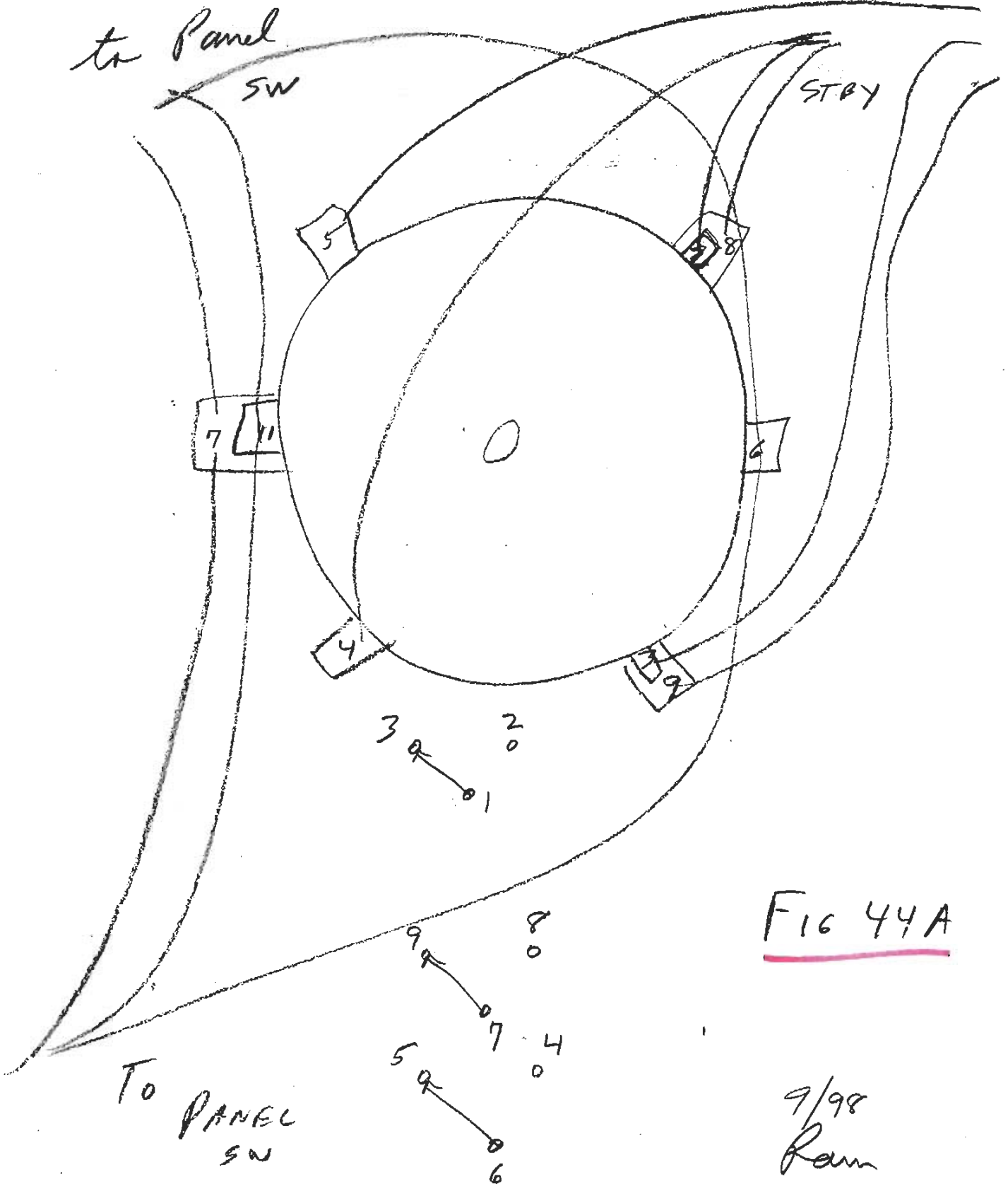
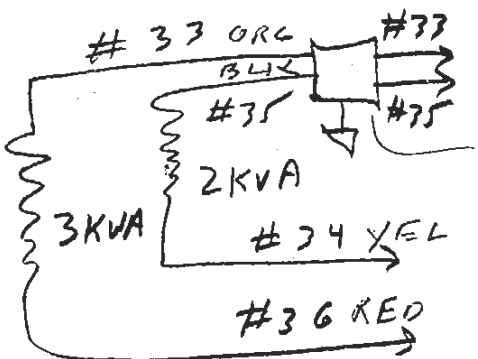
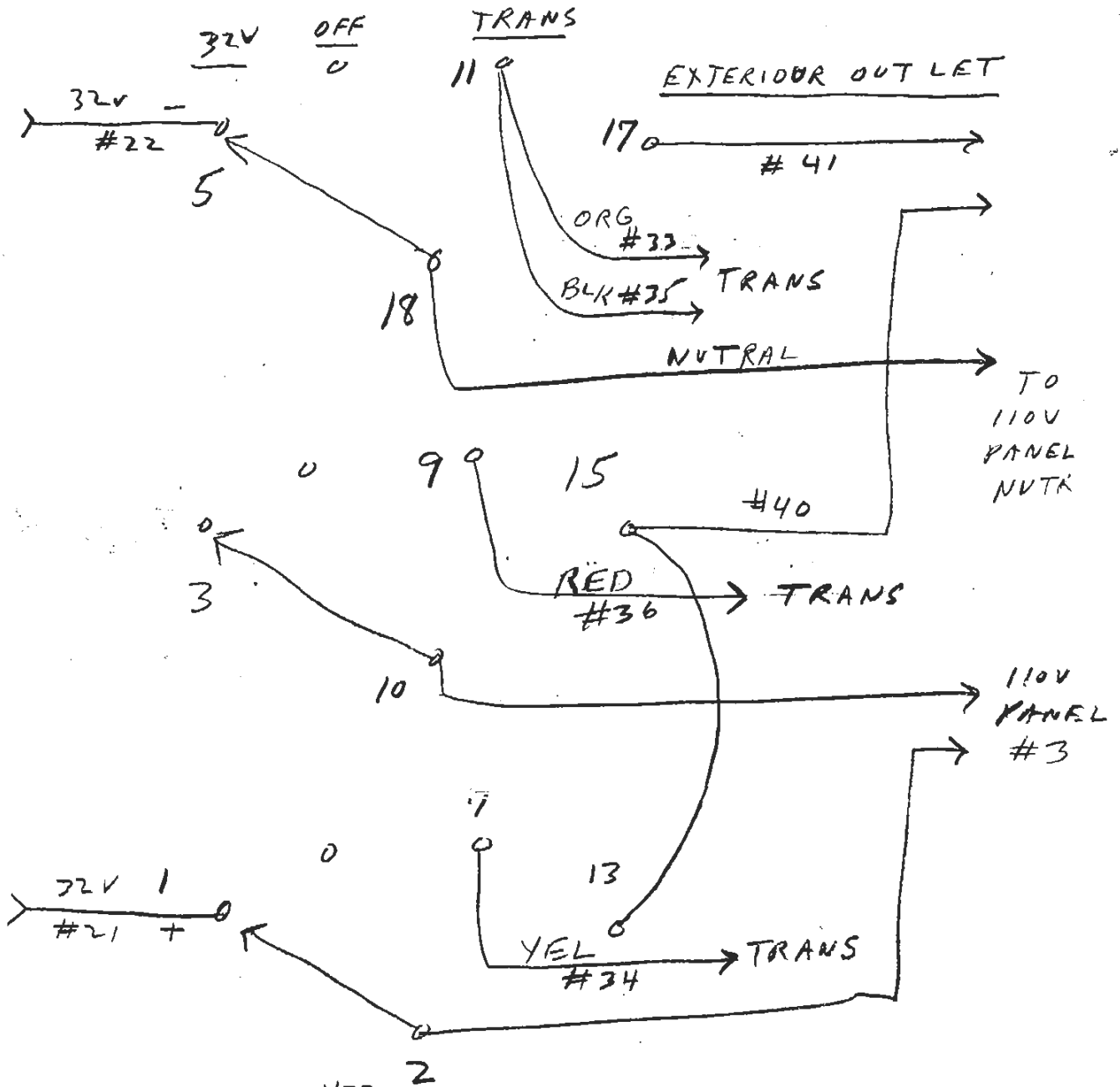


FIG 44A

9/98  
Rann

# 120 V SW FOR PANEL 3

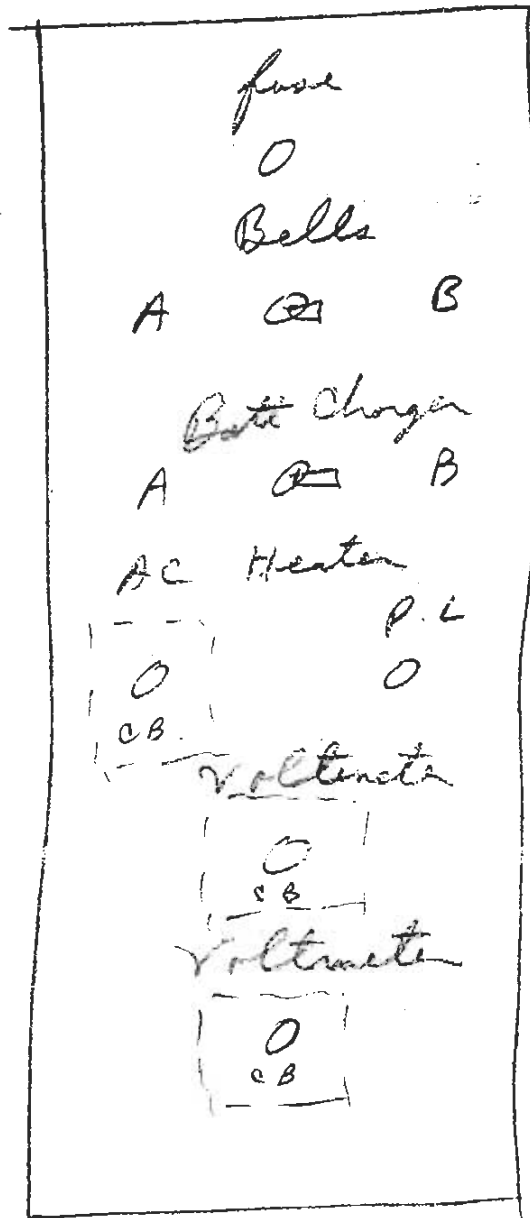


GRN AT TOP CB PANEL

FIG 45

TRANS  
Rum  
1/96

# Sub Panel



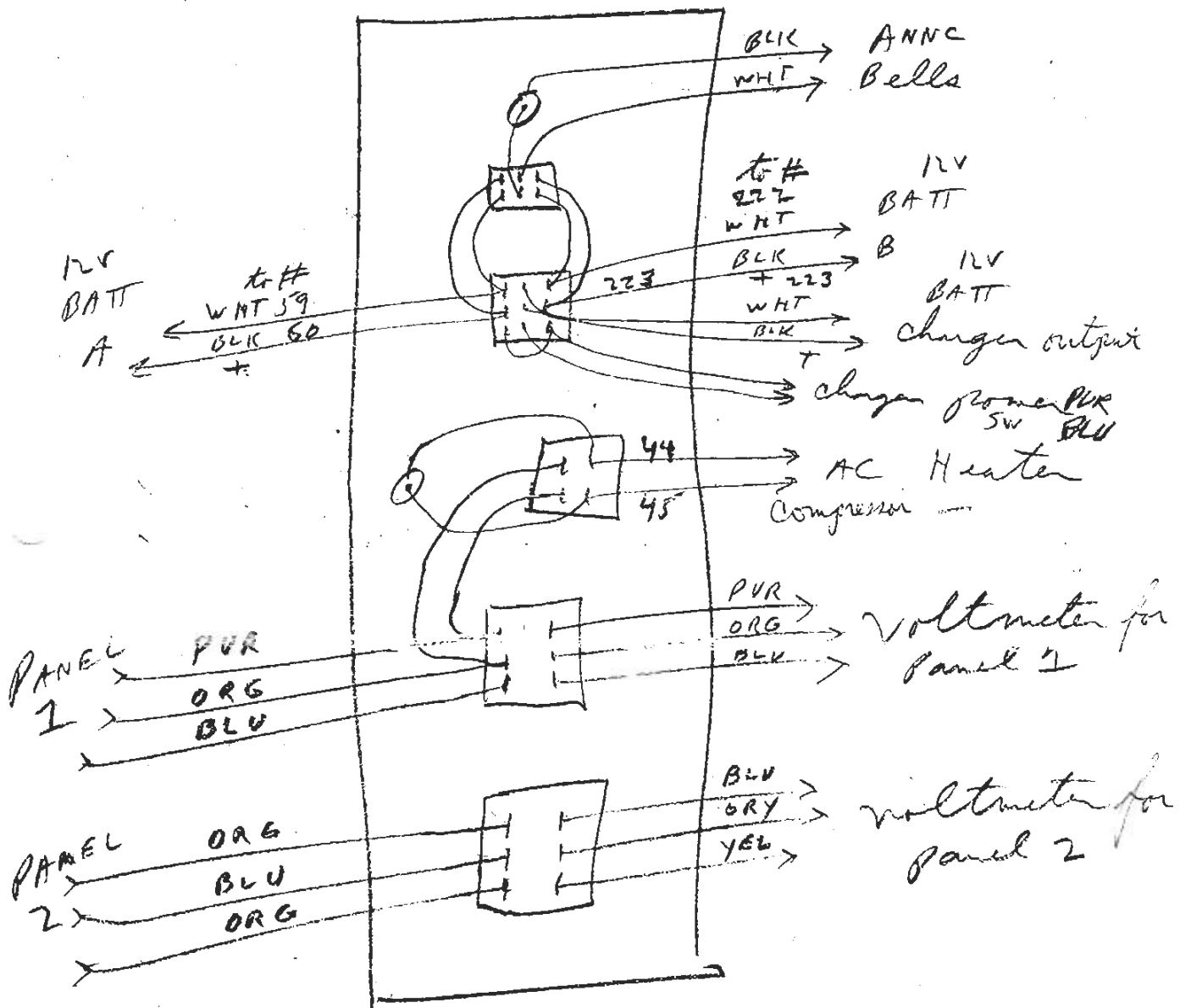
Bell circuit sw  
from Batt A  
or B cent OFF

Batt charger sw  
to Batt A or B  
cent OFF

FIG 46

Power  
7/98

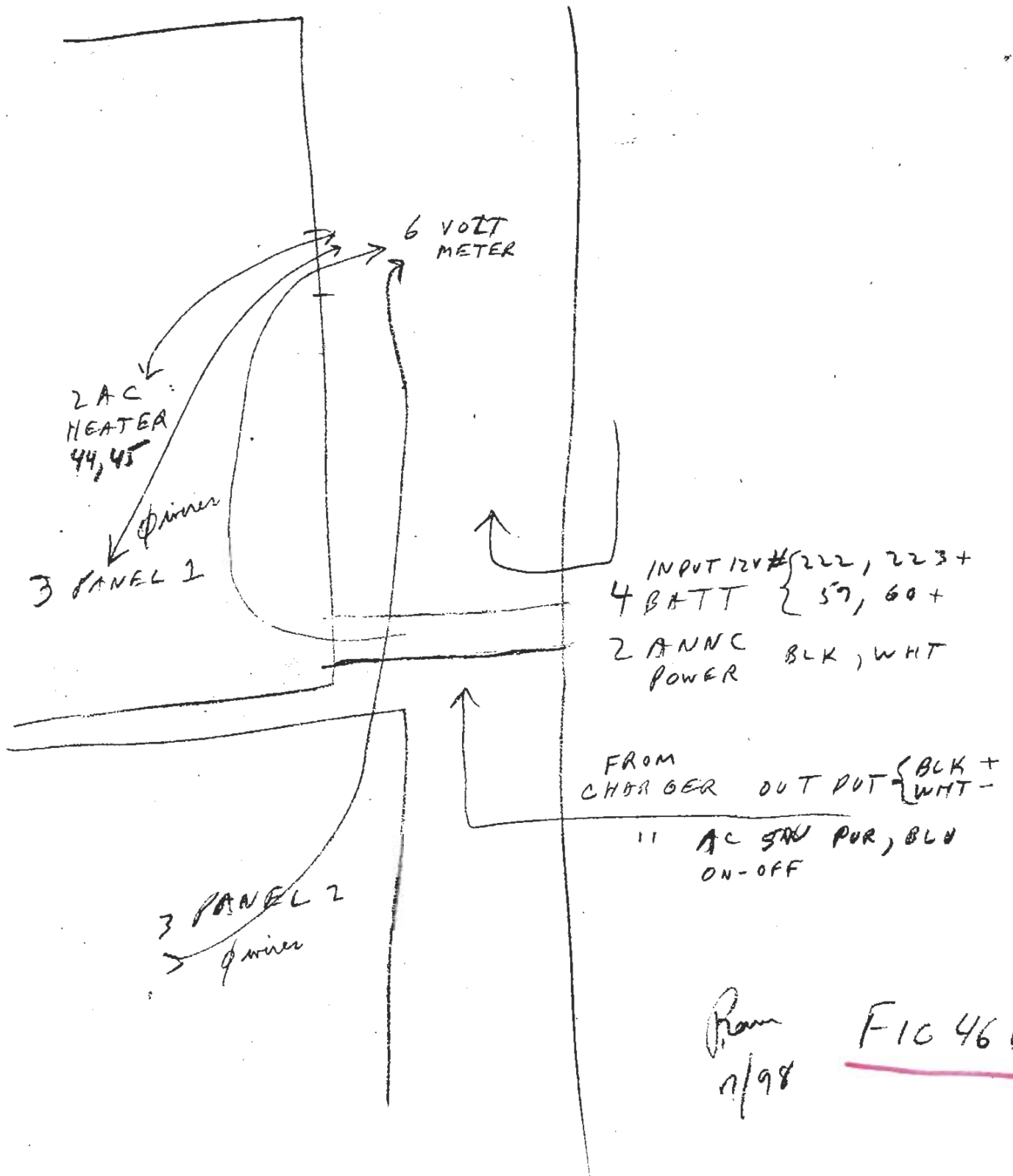
# Meter / Bells / Charge Panel Sub Panel



Ram  
7/98

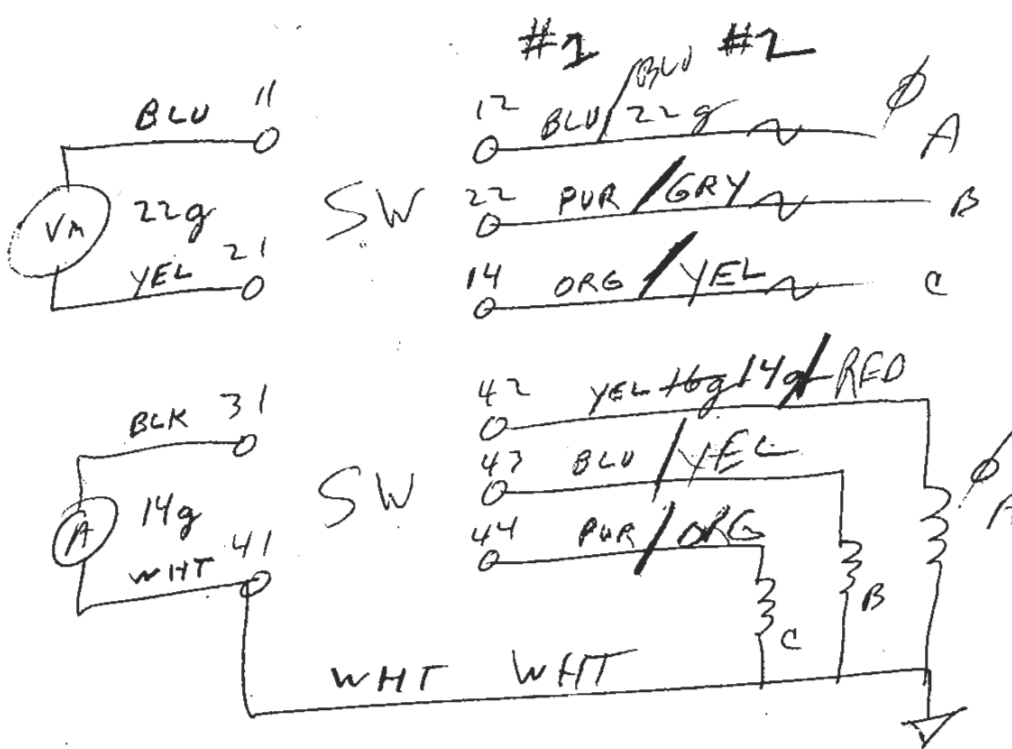
FIG 46A

# Sub Panel wiring



Ram  
7/98

FIG 46 B

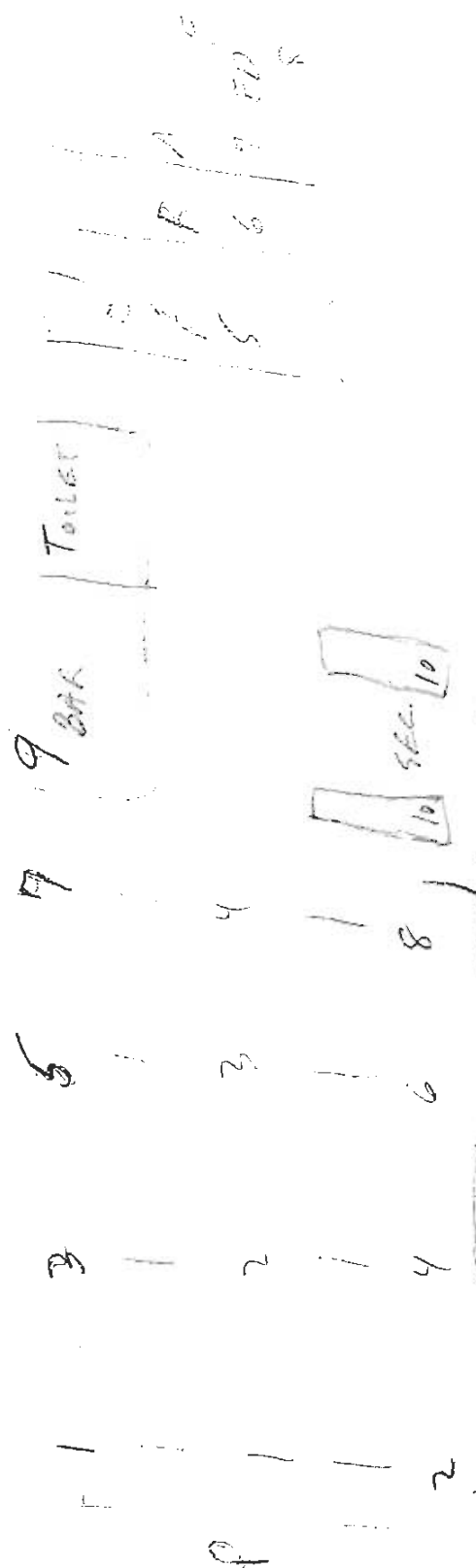


PANEL 1 /  
PANEL 2

Panel Meter SW

FIG 46C





Combine for setting 4...

FIG 47

12 drops

1-10, (comf...)

1-4, range 5-20  
 2-10, 10-20  
 3-20, 20-30  
 4-30, 30-40  
 5-40, 40-50  
 6-50, 50-60  
 7-60, 60-70  
 8-70, 70-80  
 9-80, 80-90  
 10-90, 90-100

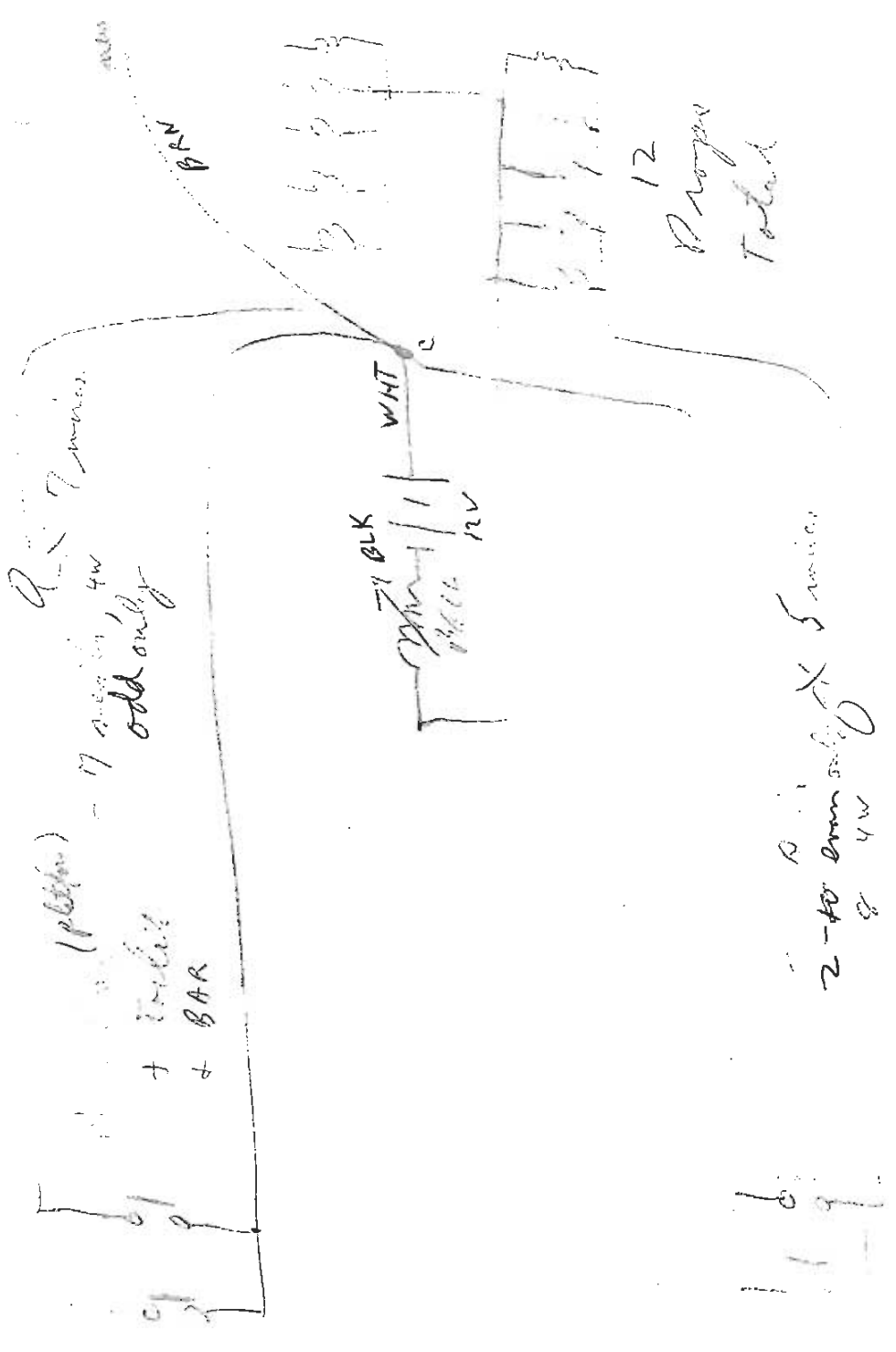
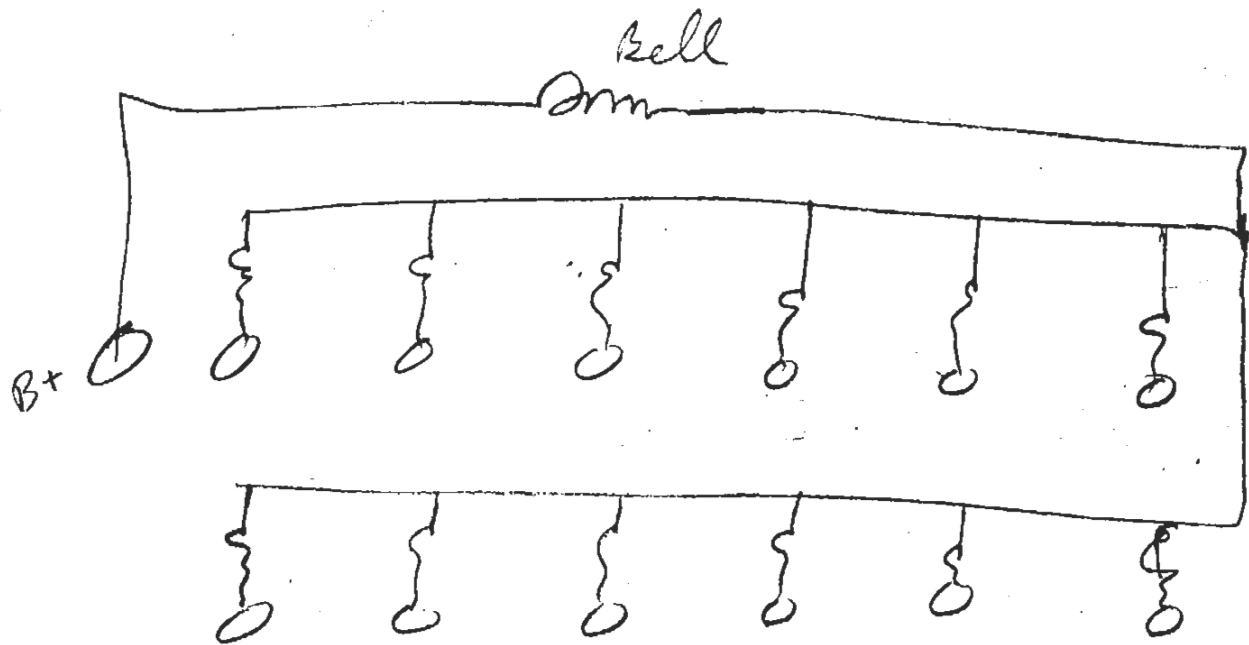
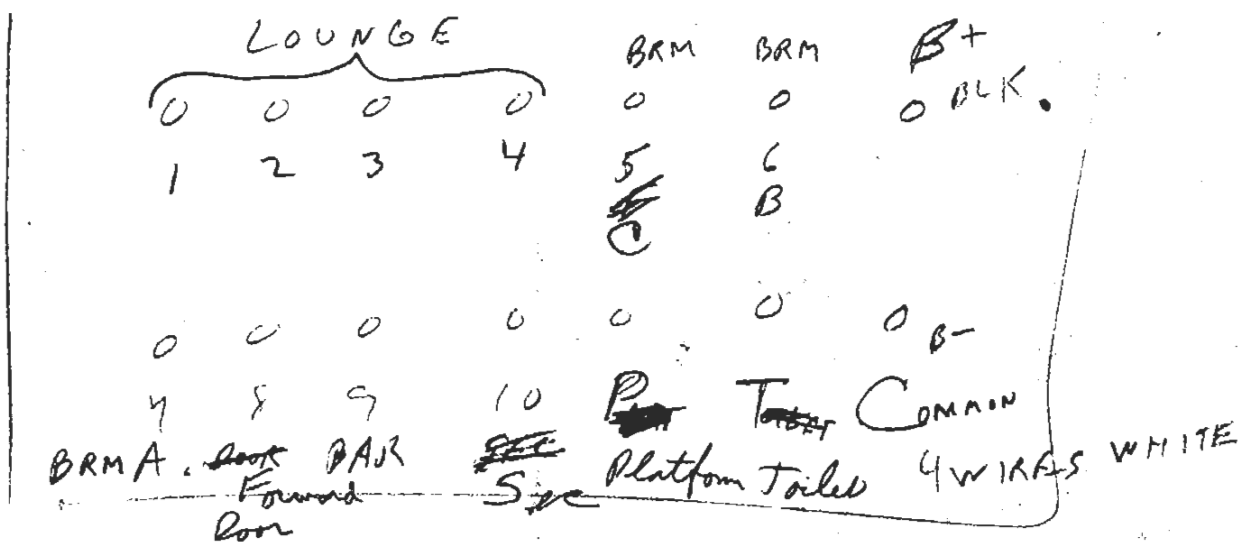


FIG 47A



Annunciator (near view)

FIG 47B



wall Display  
Above panel board

10/93  
R.

# Annunciator Panel

WIRE #

0 more 2 to 1 (19)

" 3 to 2 (18)

" 4 to 2

" 5 to 3 (17)

" 6 to 3

" 7 to 4 (16)

" 8 to 4 (15)

T toilet

9            (BAR) (~~27~~?) #9)

10            (SEC) (#10)

P platform #11

# 7 to BRM A

6-8 to BRM C

5-9 to BRM FB

8 to to

RED (GRN)

ORN (

YEL (RED)

Forward Floor

GRN (WHT)

Toler #26  
Platform #28

FIG 47C

forward hall  
cable  
colors

Common wire

is BRN (BLK)

Ram  
6/95

J strip Hall locker ceiling  
By annunciator

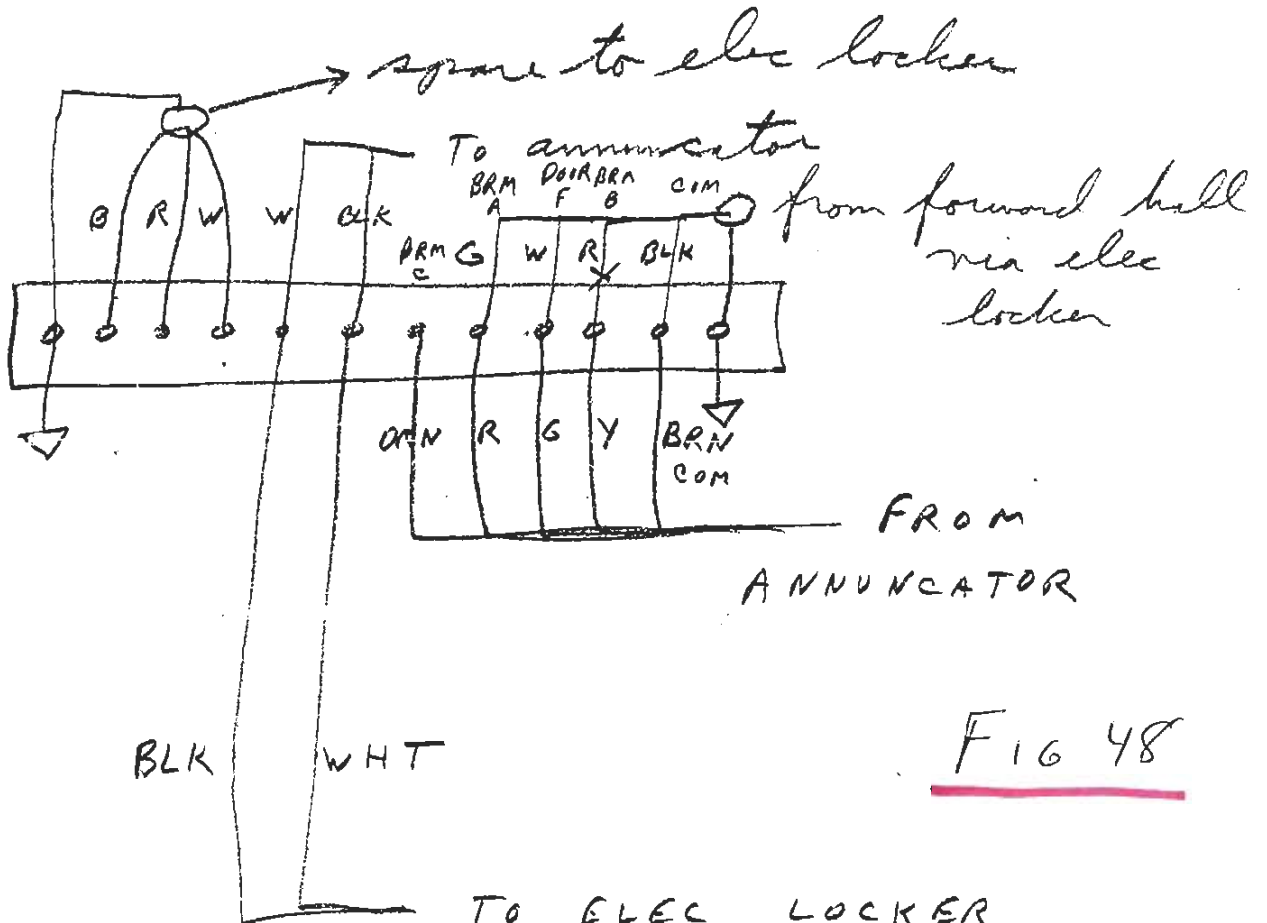


FIG 48

TO ELEC LOCKER  
FOR POWER  
FROM DP SW +12V  
FROM BATT A & B

Renn  
9/95

at Elec Locker  
Spares

2 w shielded from forward  
door (audio)

3 w from annunciator terminal strip  
3 w from forward end (spare)

PUR + BLU from switch for charger  
BLK + WHT to charger output  
+ -

FIG 48A

? for speakers RM A  
or to RM B

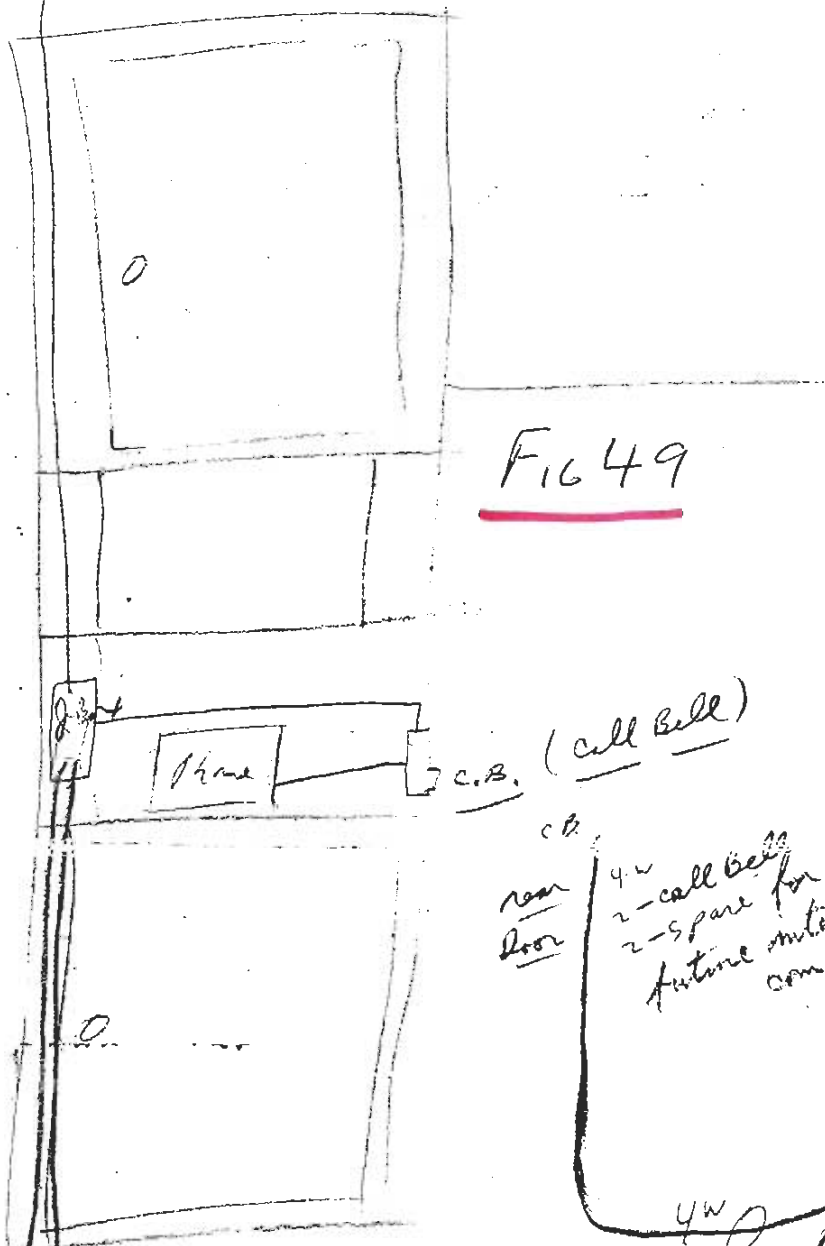
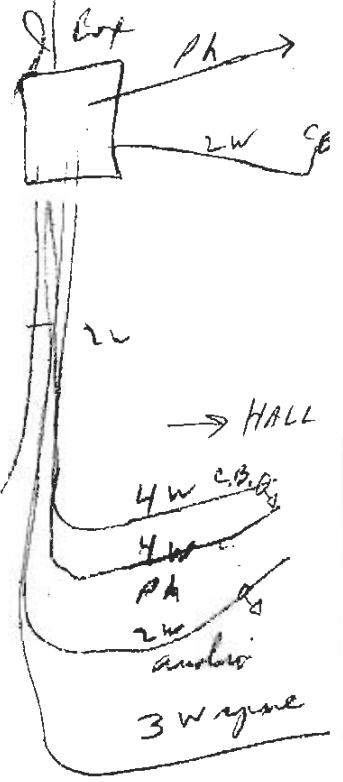


FIG 49

future  
2 audio  
2 for c.B.  
from RM B



c.B.  
4w  
2 - call bells  
2 - spare for  
future inter  
com

Forward  
door  
1/2  
conduct

to Hall RAD BOX  
1/2 conduct

4w  
Forward  
door

Bedroom A cabinet

Ram  
3/95

# TERMINAL STRIP

BRM A J BOX in cabinet

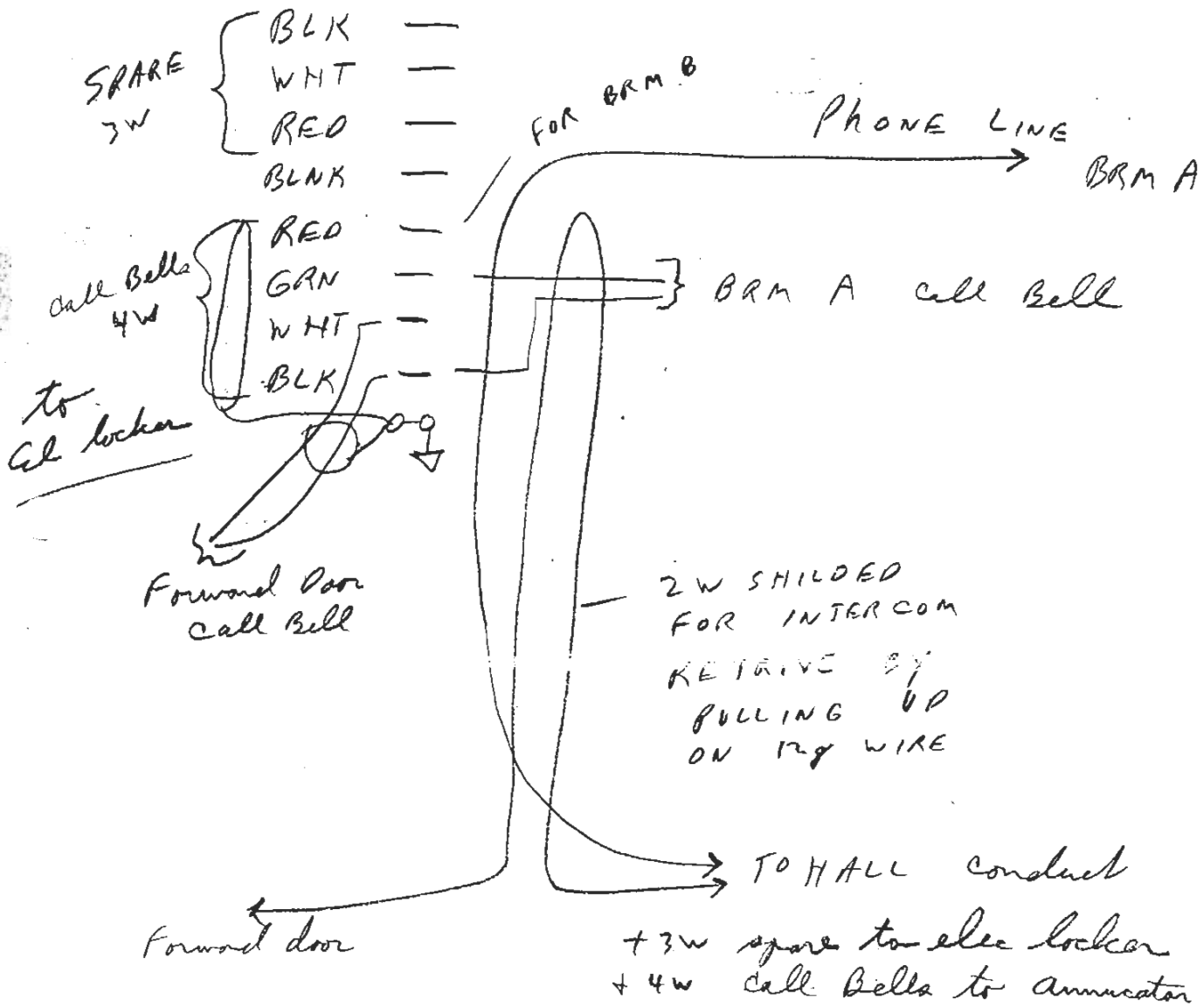
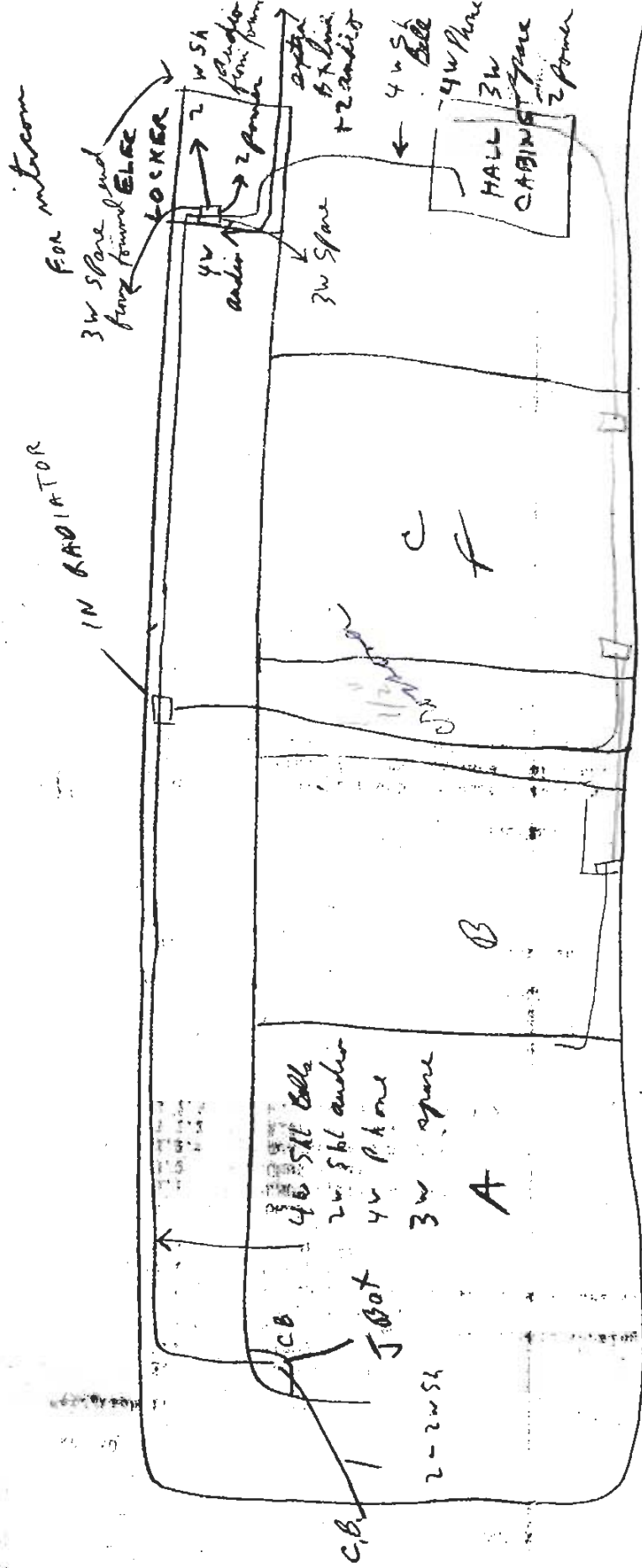


FIG 49A.

Ram

7/95





Call Bell, Audio  
& Phone circuits

FIG 49B

Ram  
3/95

Call bells, Audio  
+ Phone

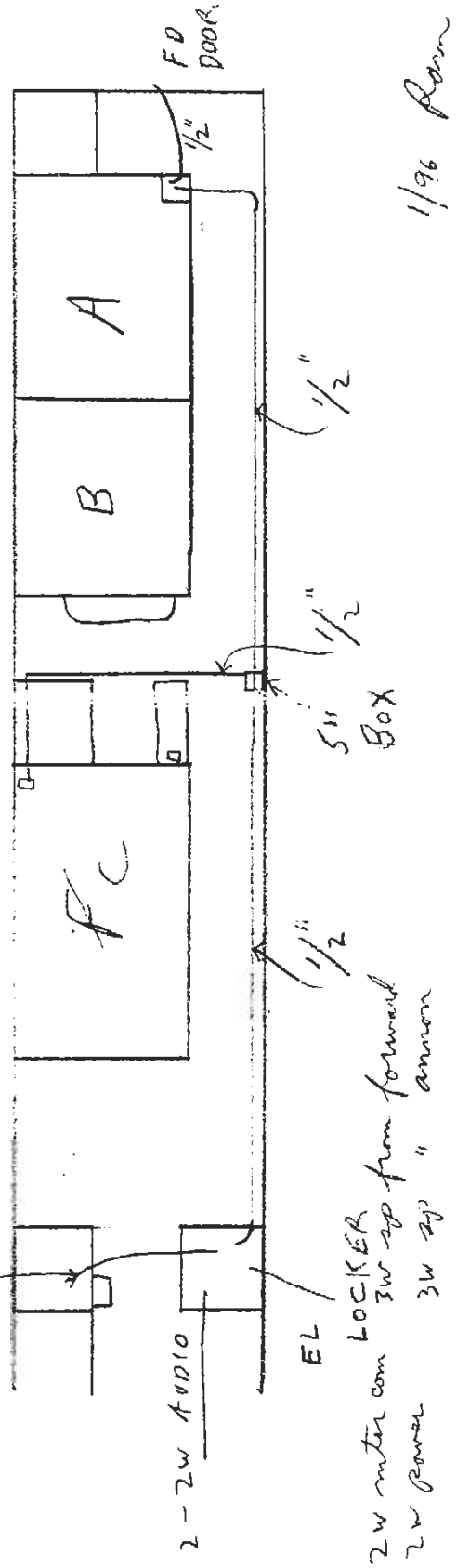
# FORWARD HALL BELL CONDUIT

FIG 49C

4w Bells  
4w Phone  
3w Spare  
2w Power  
BLK + WHT

From Bin A to Elec Locker

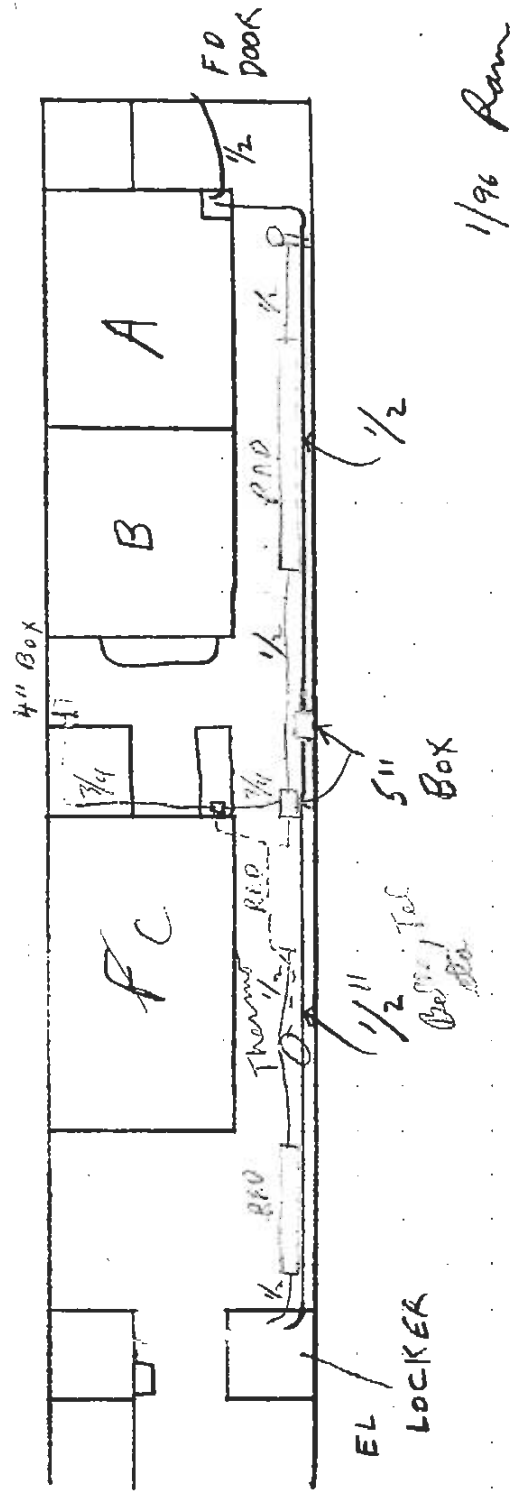
4w shielded for call bells to annunciator  
4w Phone to annunciator  
3w spare + 2w for intercom - shielded



1/96 Rev

# Heat & Cool FORWARD HALL

FIG 50



Call bells, Audio  
+ Phone

FORWARD HALL

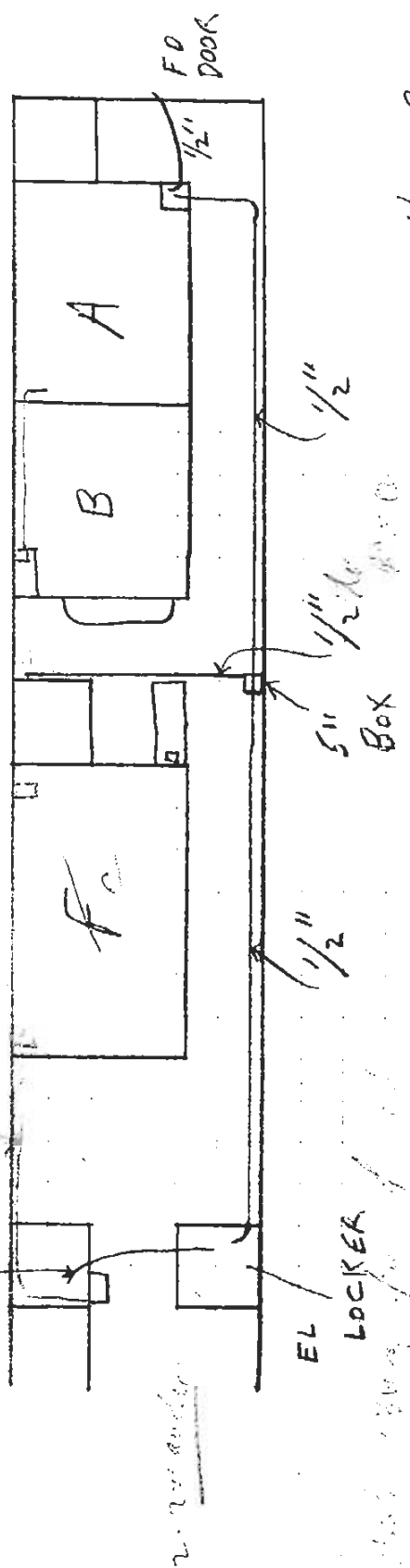
REAR BELL CONDUIT FIG 51  
BRM SIDE

4w Bells  
4w Phone  
3w Spare  
2w Power  
BLK WHT

6" Phone

3w CB

3w SP From BRM A to Elec Locker  
2w SP 4w shielded for call bells  
1/2" 4w Phone + 2w for intercom shielded  
3w spare



1/96 Ram

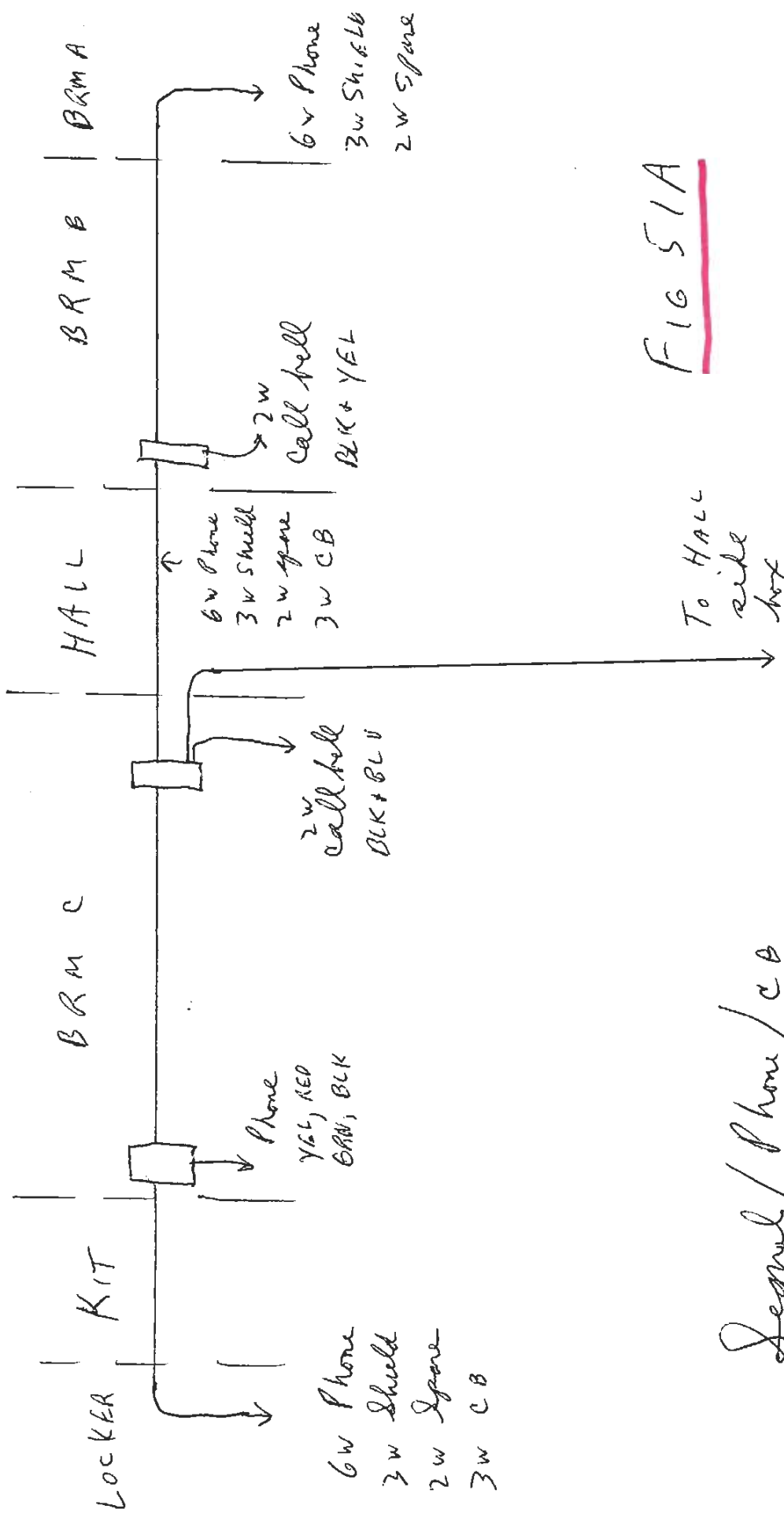
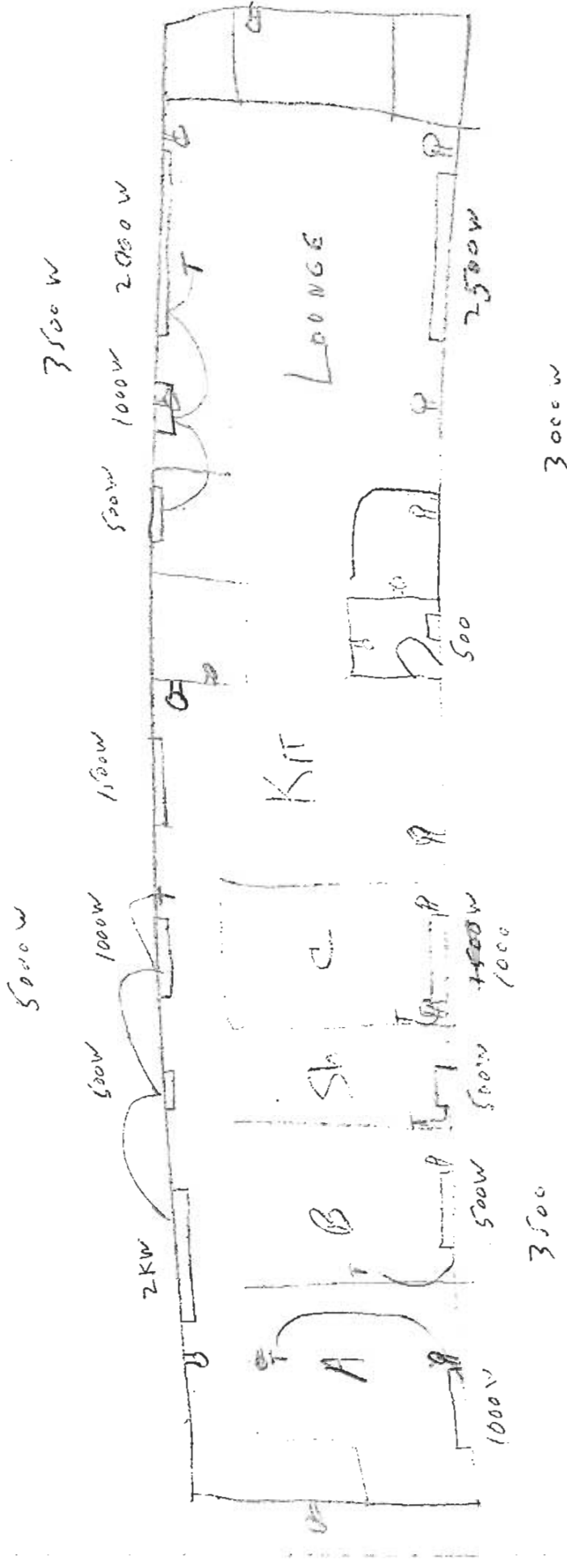


FIG 51A

Signal/Phone/CA  
Lines  
BER ROOM SIDE



Planting and outdoor plan F1652

Total 14500 W  
15000 W

6/96 Rain

# Heating Design

	$\phi$ AB	$\phi$ BC	$\phi$ CA
Lounge	2500	2000	2000
Bedrooms	1000	1000	1000
<hr/>			
	3500	3000	3000

$P_{max}$  9500 W  $\frac{5}{6}$  OK for one diesel gen

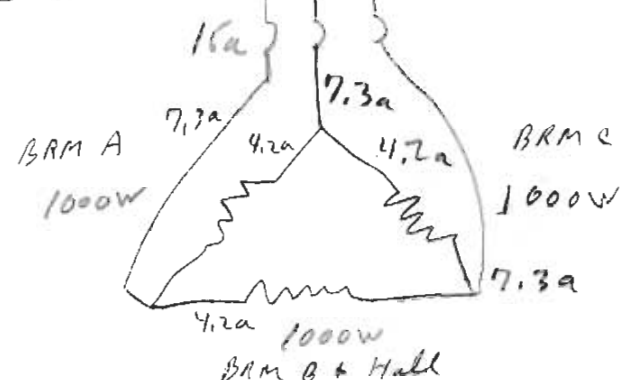
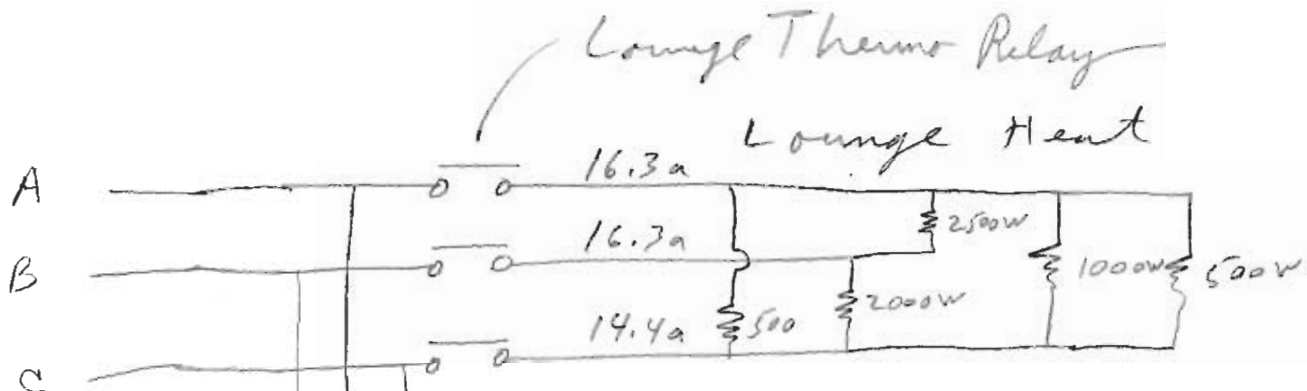
Overhead  $3000 \text{ W} / \phi = 9000 \text{ W}$

Kitchen heat (1500W) and Forward Hall  
3500W

on second generator  
+ lighting and appliances

6/96 Ram

# Heating Circuits



## Currents

	A	B	C
16.3	16.3	16.3	14.4
7.3	7.3	7.3	7.3

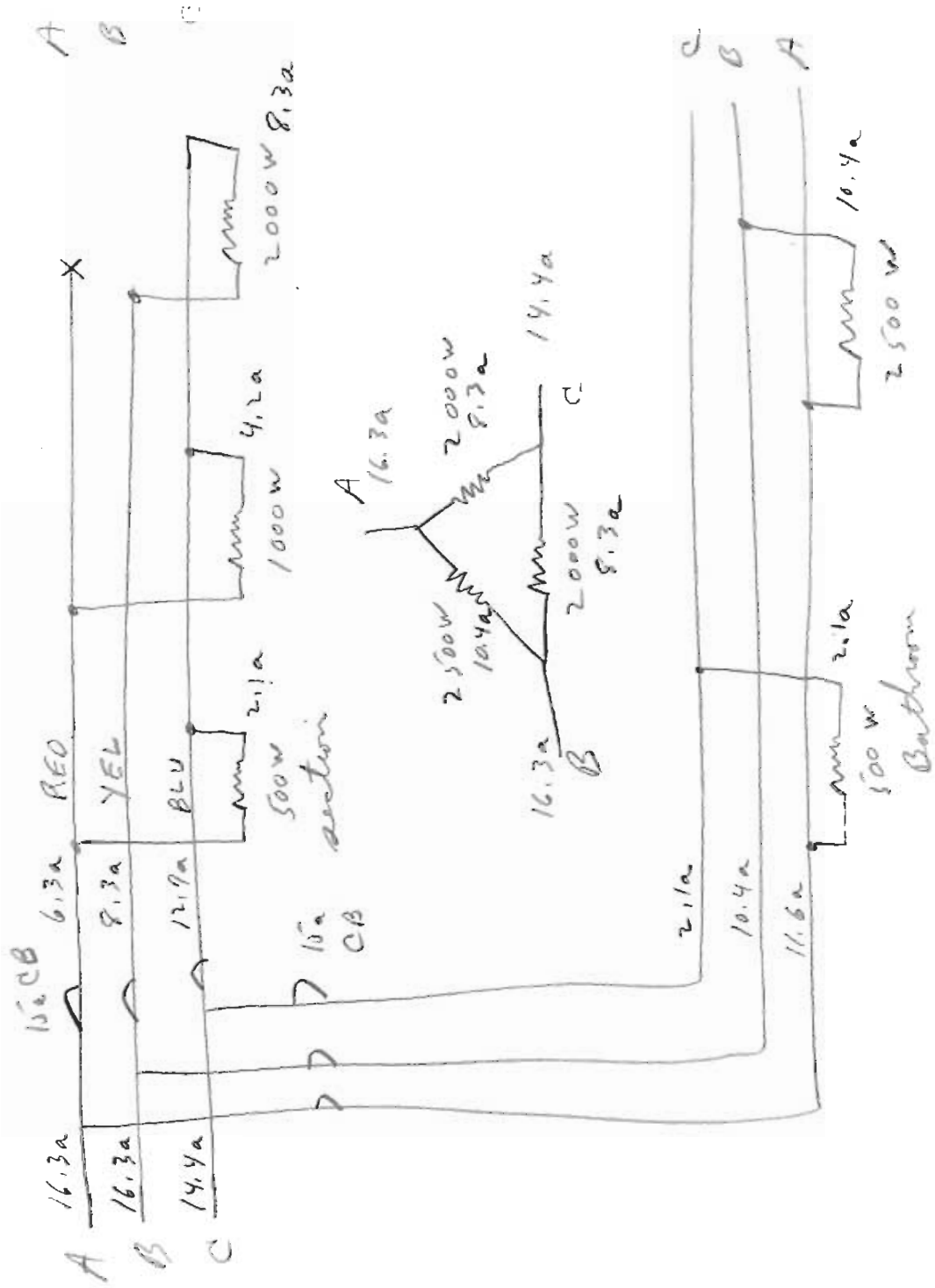
max current 23.6 23.6 21.7

split into 3 circuits

- Bedroom 15a CB
- Lounge R 15a CB
- Lounge L 15a CB

6/96 Roma

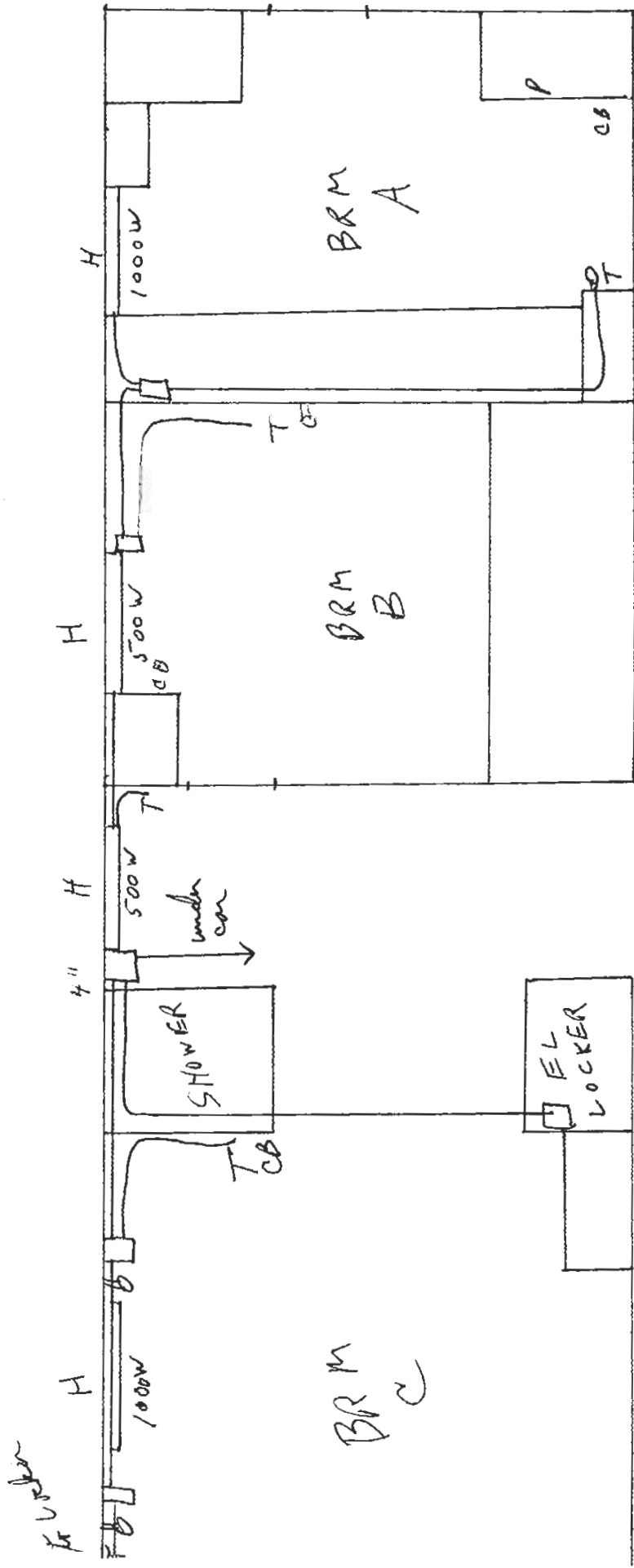




Total 6500w

Range Heat

6/9/96



H = Heater  
 T = Thermostat  
 CB = Call Bell  
 P = Phone  
 Q = 120V outlet

Power  
 Wiring

FIG 53

From  
 1/10/03

Plan  
11/02

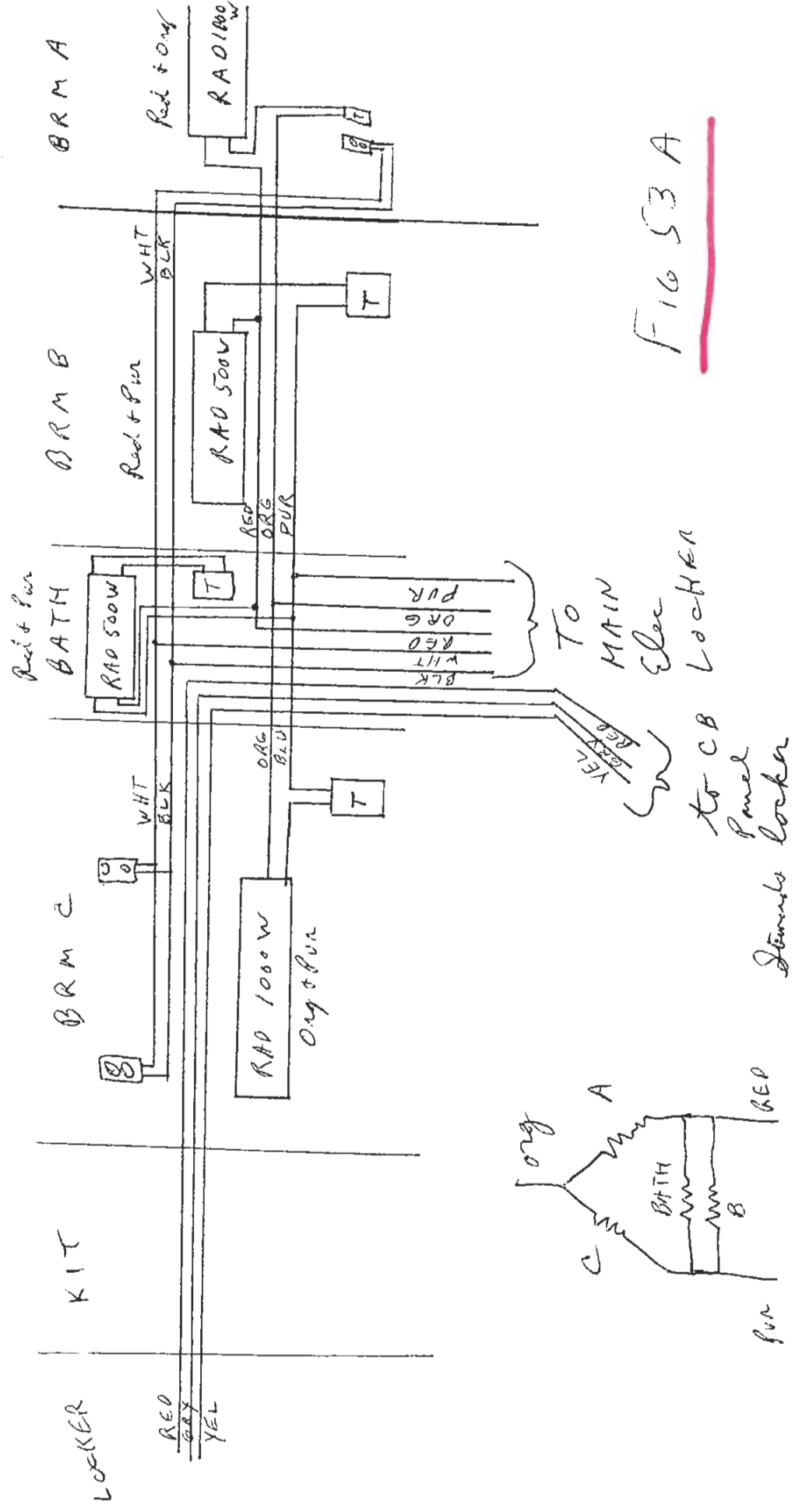


FIG 53 A

BEDROOM OUTSIDE WALL WIRING



FIG 54

# BRM A

outside wall piping

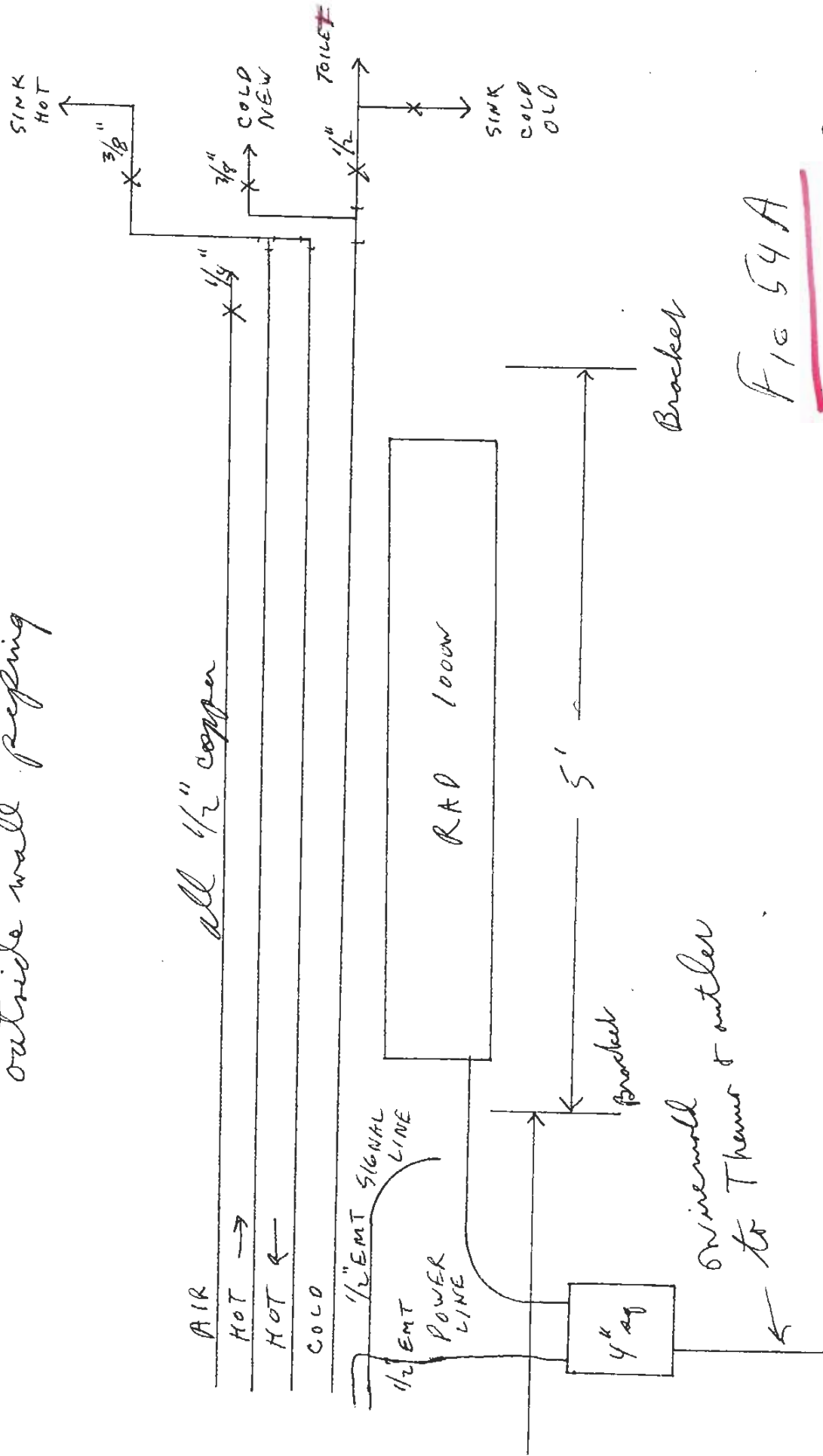


FIG 54 A

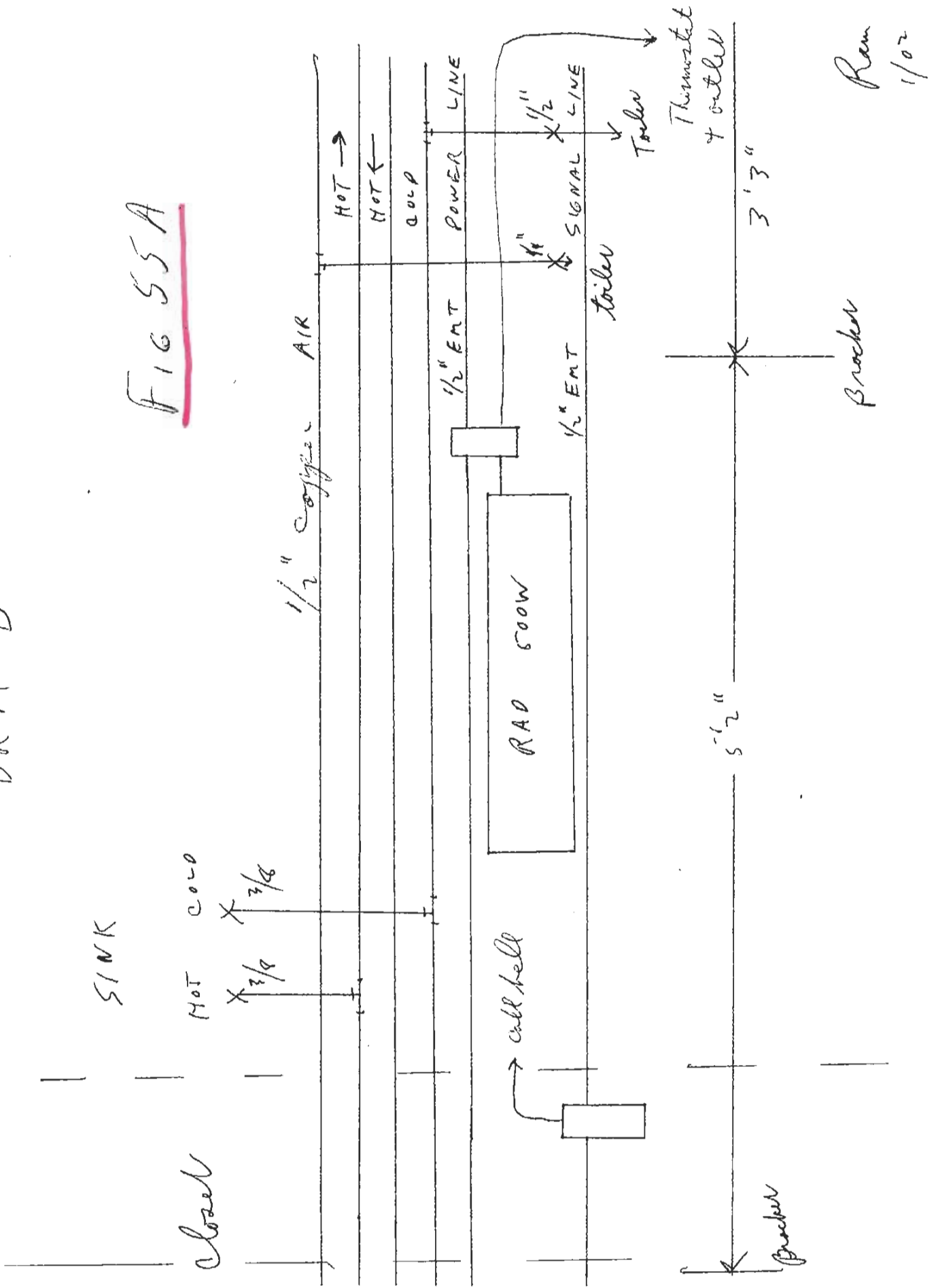
From 1/02

FIG 55



BRM B

FIG 55A



Ram  
1/02

FIG 56







F  
1  
6

57



F  
1  
G



58

HALL

FIG 58A

clean

SHOWER

BRM  
C

HOT COLD  
3/8" X 3/8"

1/2" copper AIR

HOT →

HOT ←

1/2" copper COLD  
1/2" EMT POWER

RAD 500 W

1/2" EMT SIGNAL

4" sq

1/2" to under car

3/4" copper

1/2" EMT

3/4" EMT

1/2" EMT

3'9"

to elec  
lock

Bracket

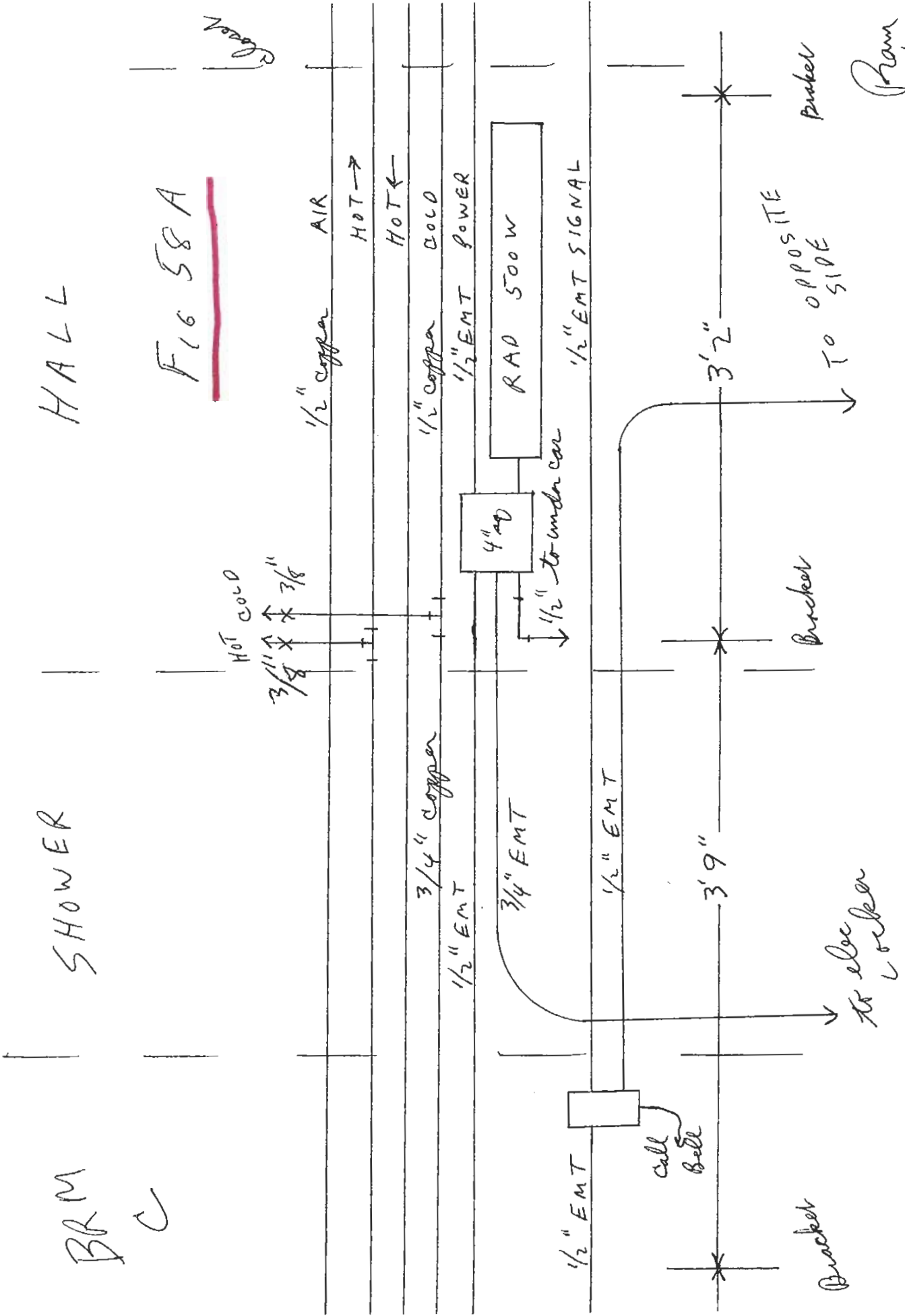
TO OPPOSITE

3'2"

Bracket

Bracket

BRM  
5/02





F16 59





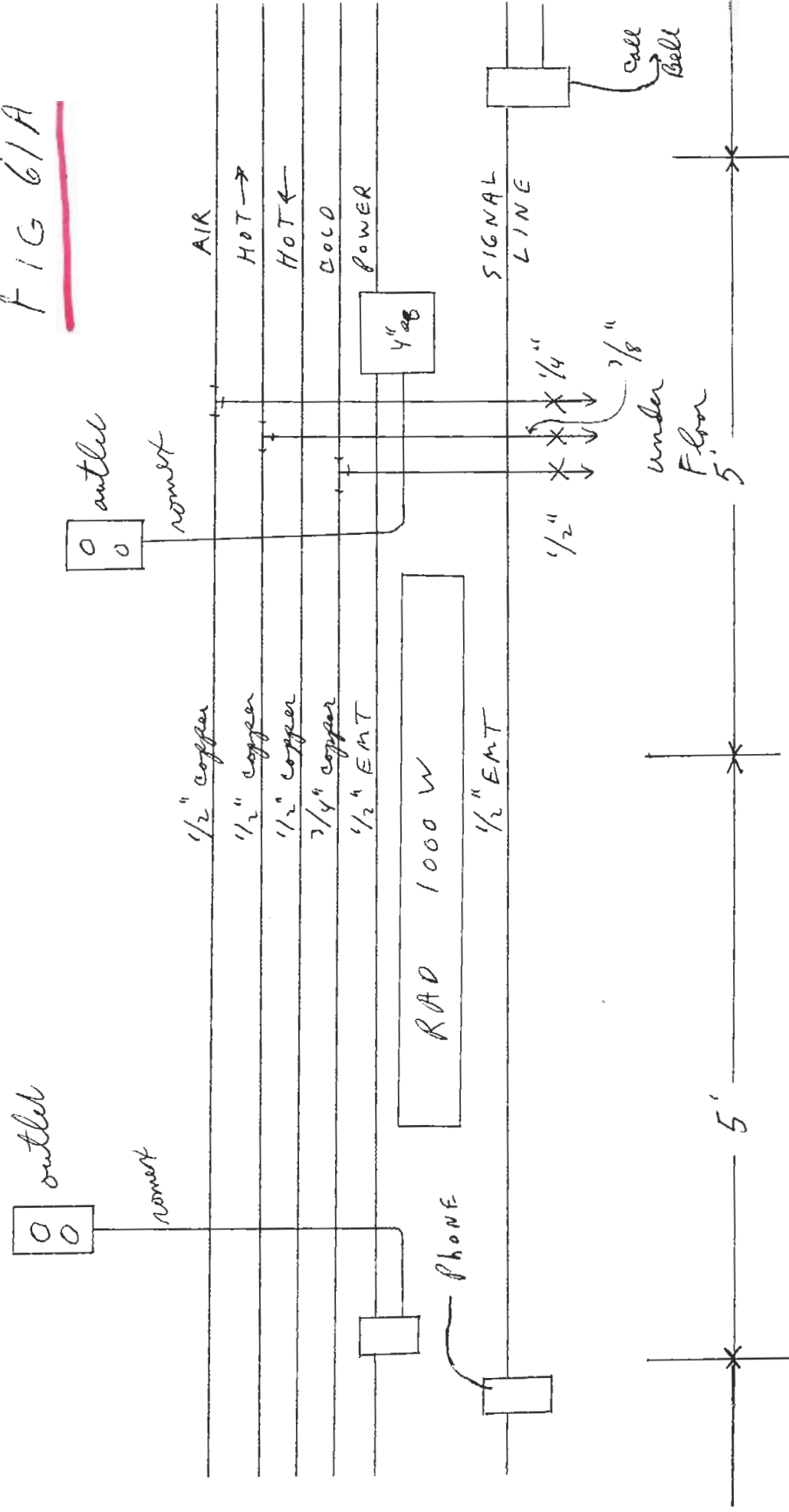
F  
I  
G  
60



F  
1  
6  
61

BRM C

FIG 6/A



Bracket Ram  
5/02

Bracket

Bracket



FIG 62





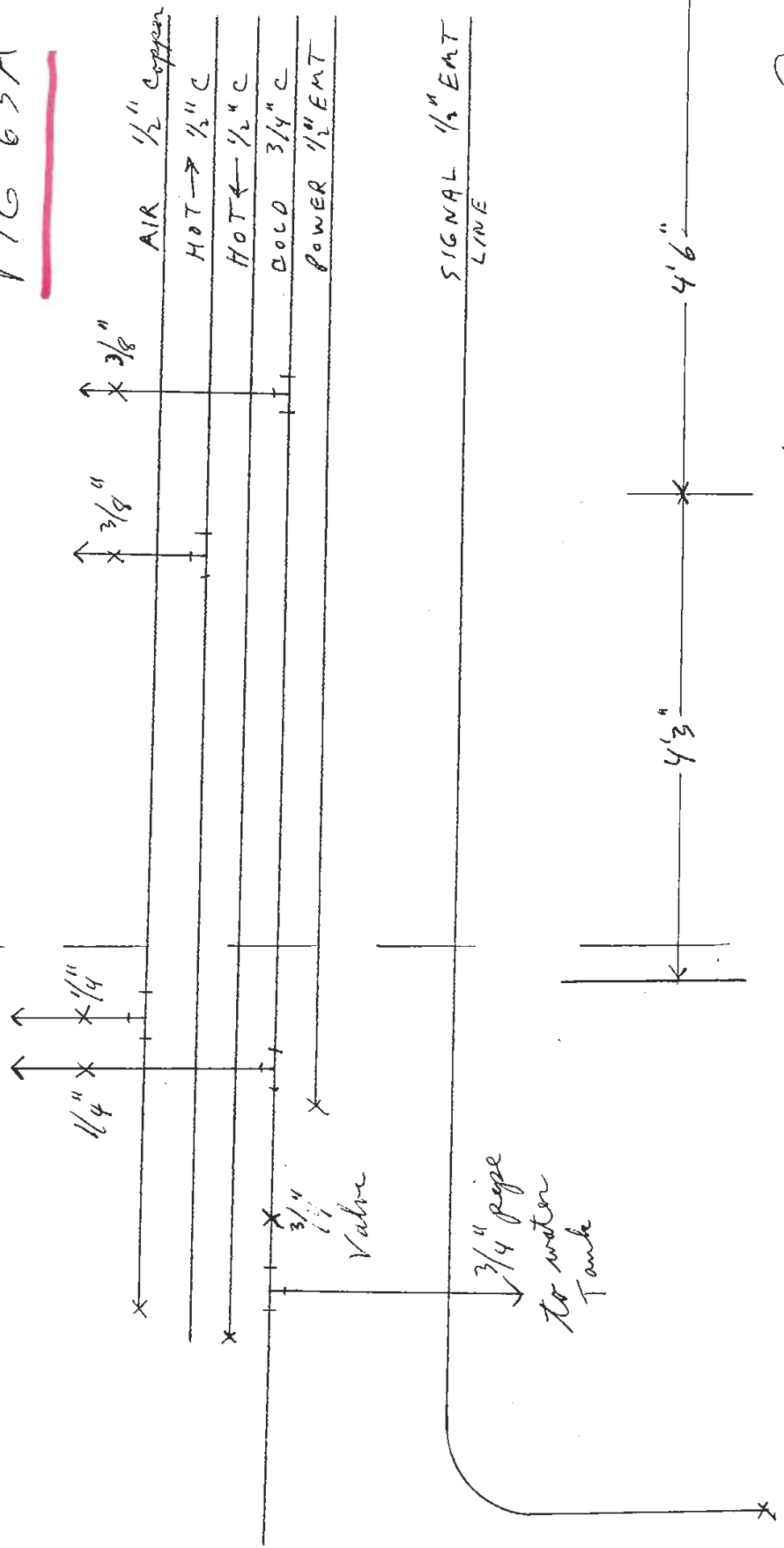
Fig 63



# PIPING DIAGRAMS

Close Kitchen

FIG 63A



Bracket

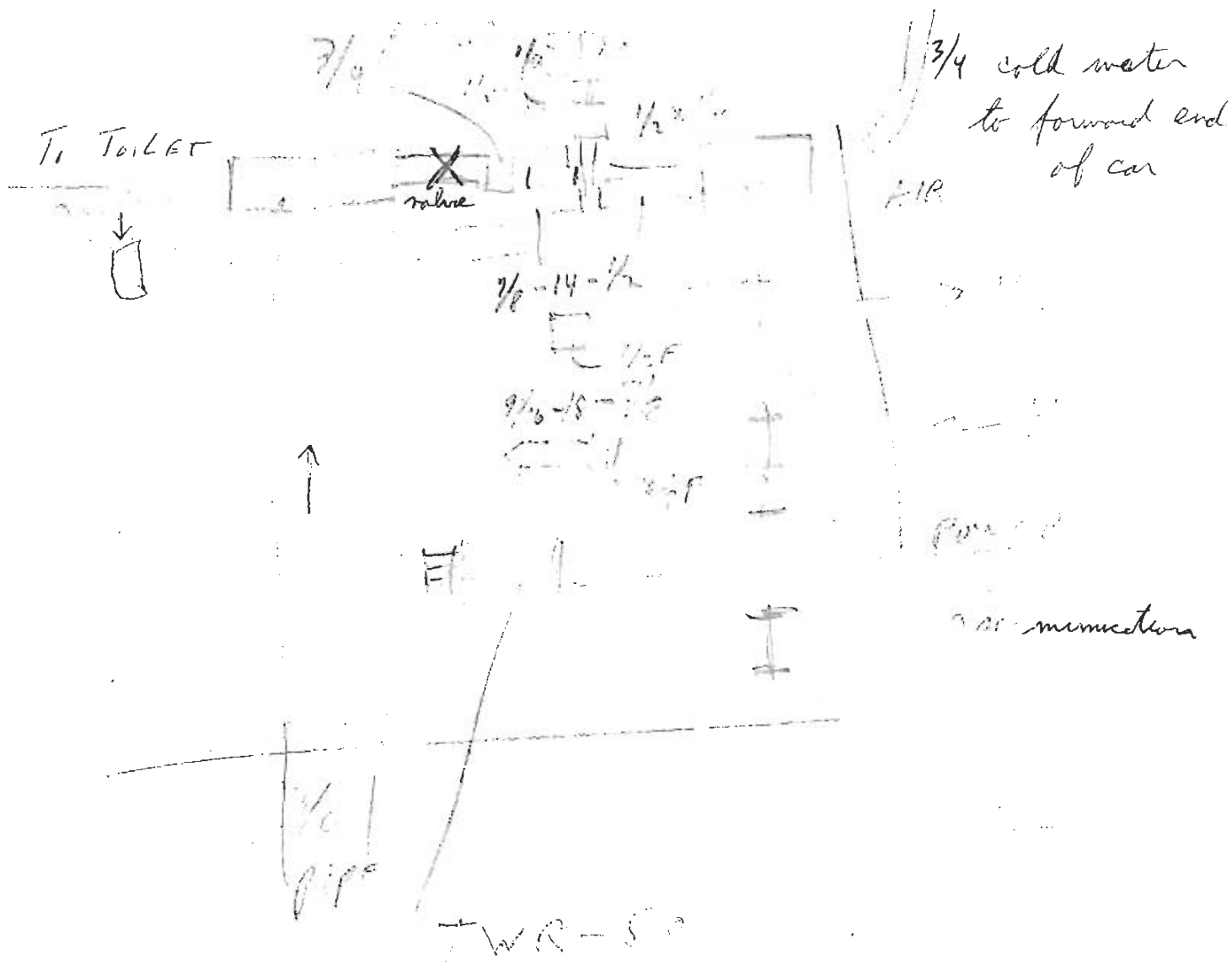
Bracket

Bracket

Ram  
5/02



Fig 64



LOCKER

FIG 64A



**LA CONDESA**  
PRIVATE RAILROAD CAR

CROTHWAIT RAILCAR RENTAL  
969 SANTA YSABEL AVENUE  
BAYWOOD PARK, CA 93401

PH. (805) 528-1002



F  
1  
6  
65



FIG 65'A





Fig 66

SHOWER FLOOR  
outside view

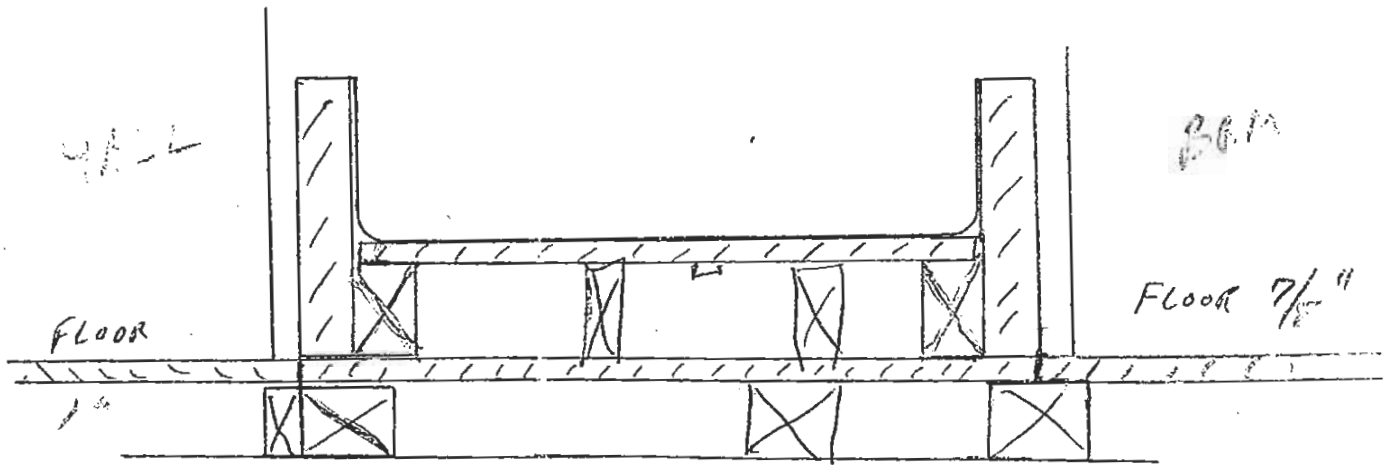
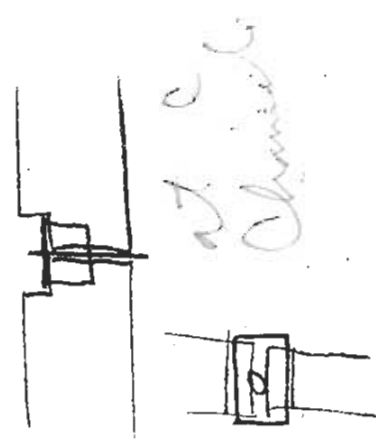
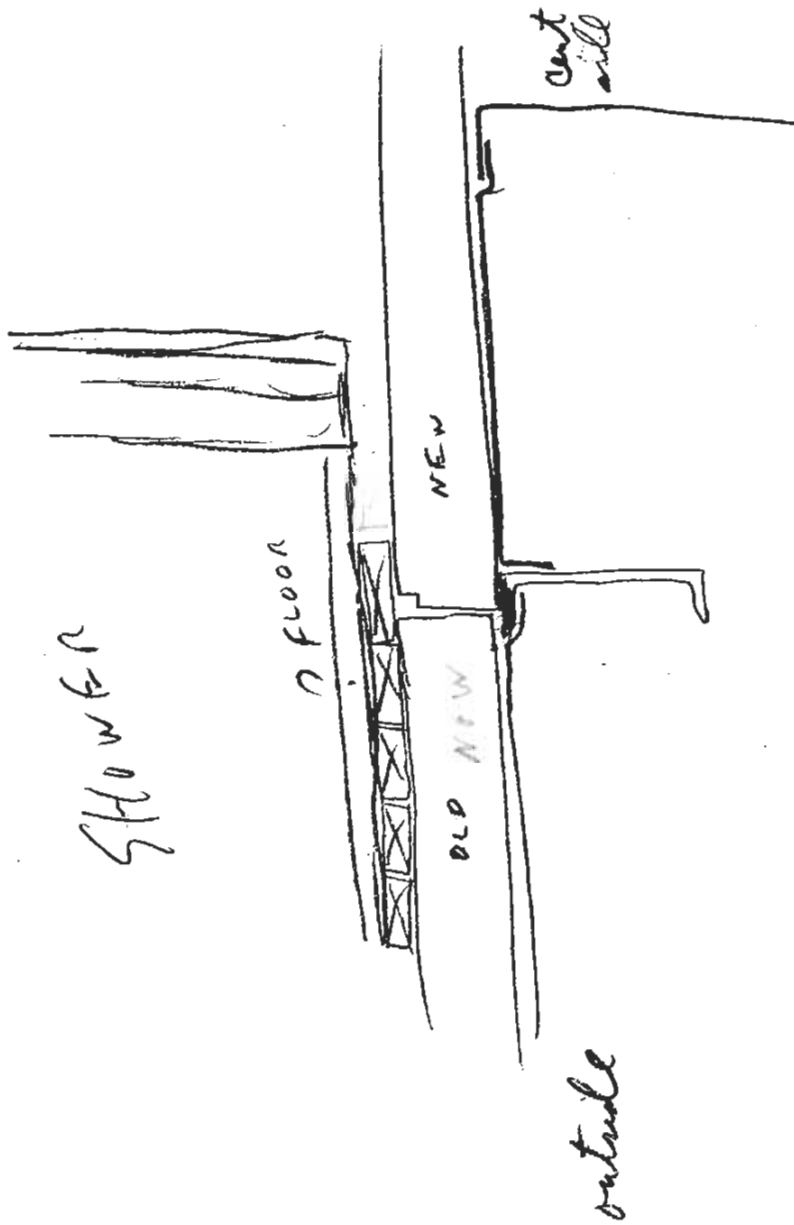


FIG 66 A





Cross section at C channel

under shower  
looking toward forward end

FIG 66B 10/93  
Ran



Fig 67

WESTINGHOUSE WATER RAISING  
REDUCING VALVE

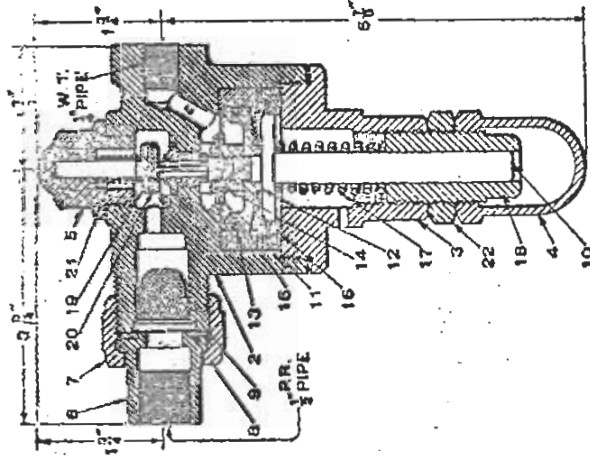


Fig. 53

WATER RAISING GOVERNOR

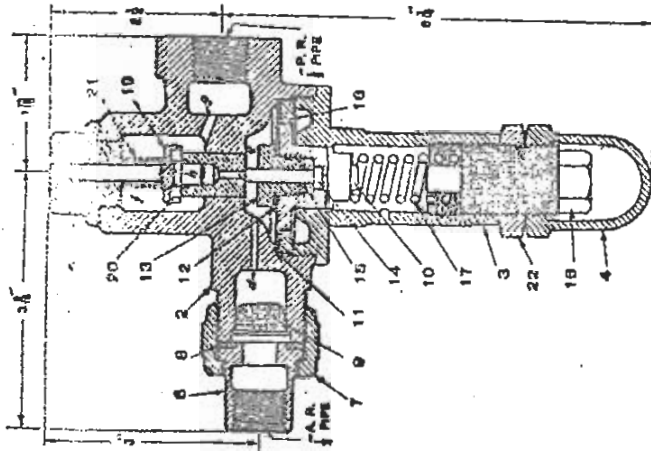


Fig. 54

Fig 68



HALL

Stewards Locker

NEW

NEW

old steam valve location

NEW NEW

SHOWER

NEW

ELEC CABINET

modified

Booster

NEW

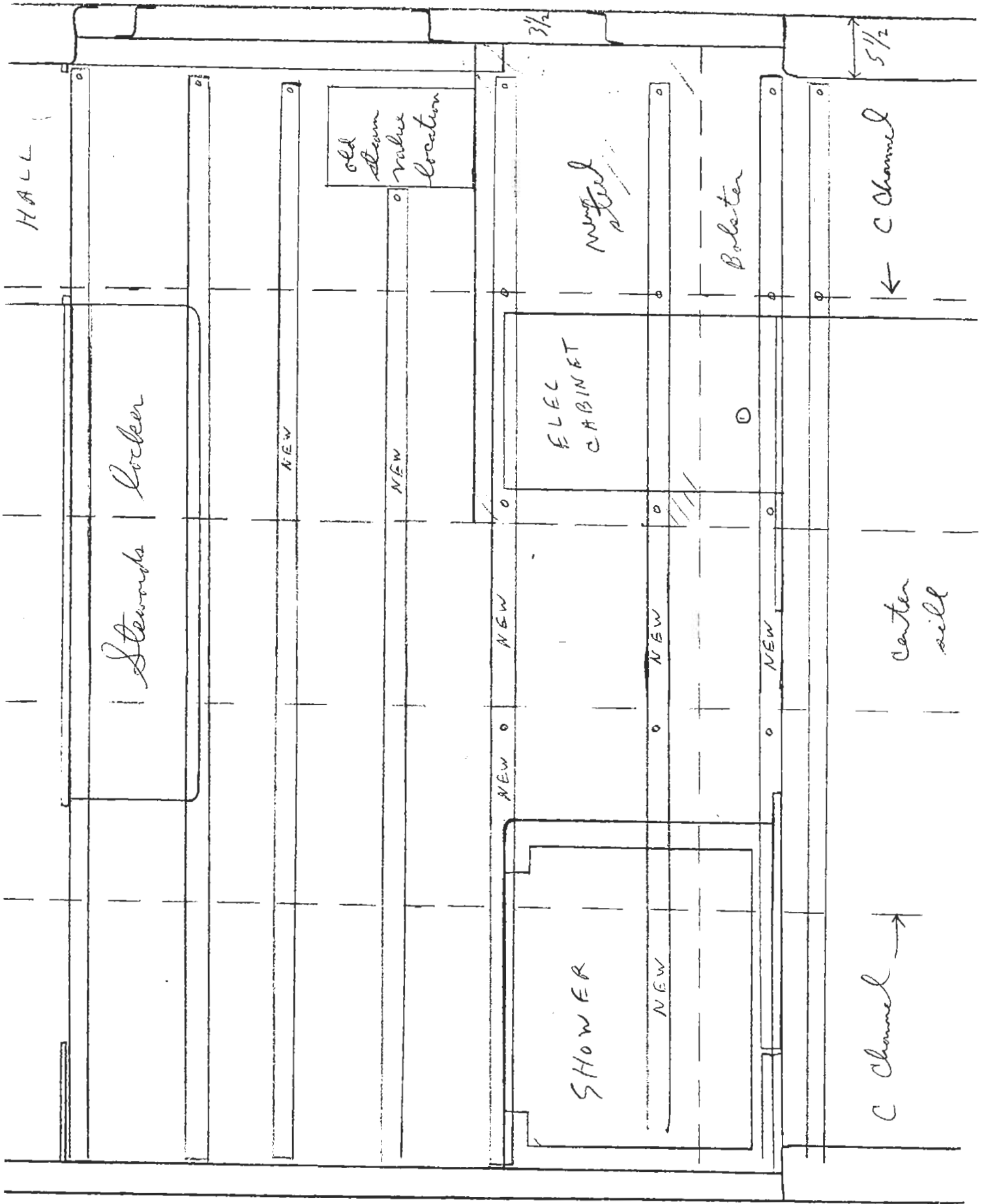
C Channel →

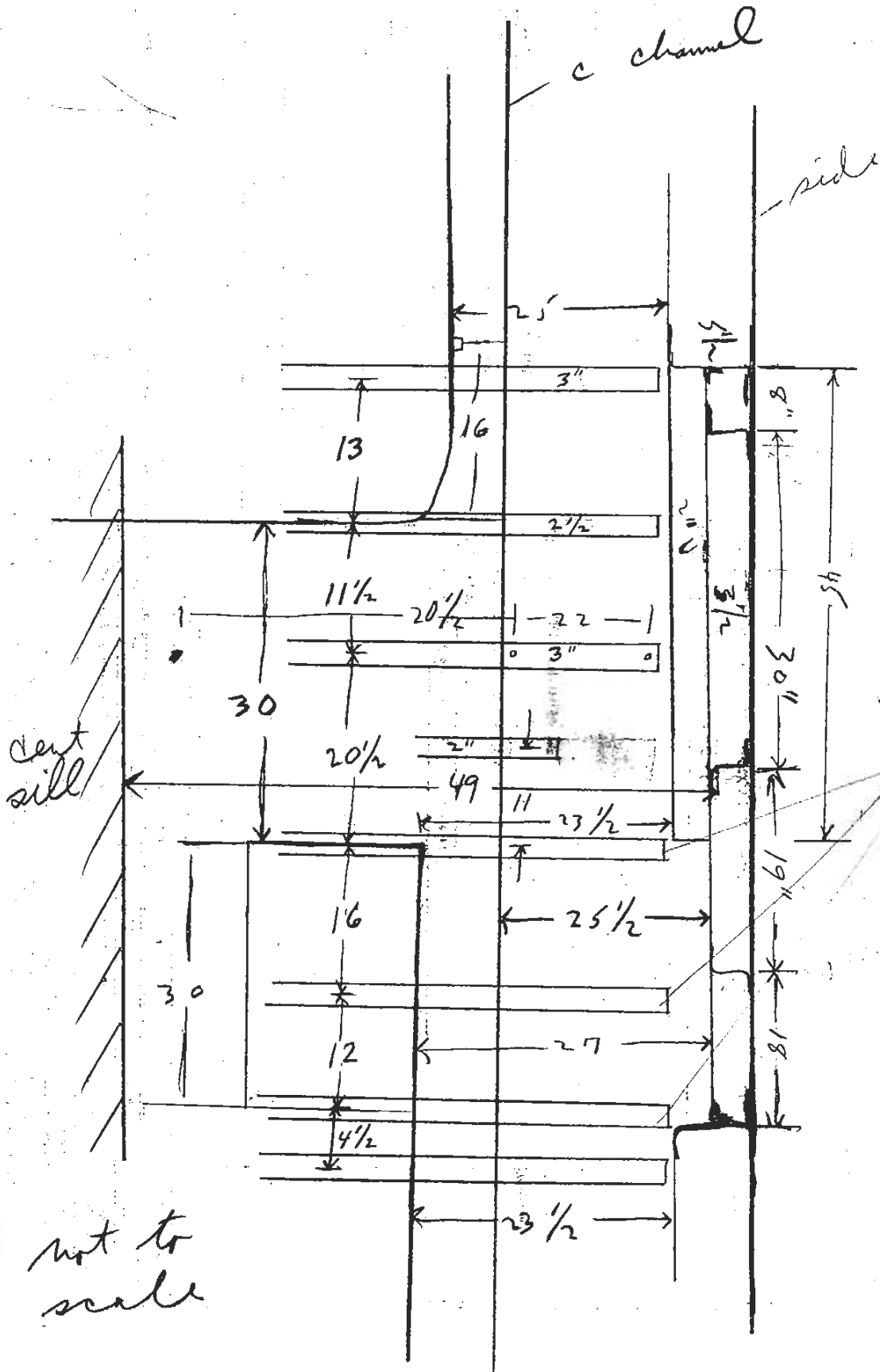
center sill

← C Channel

5 1/2

3 1/2



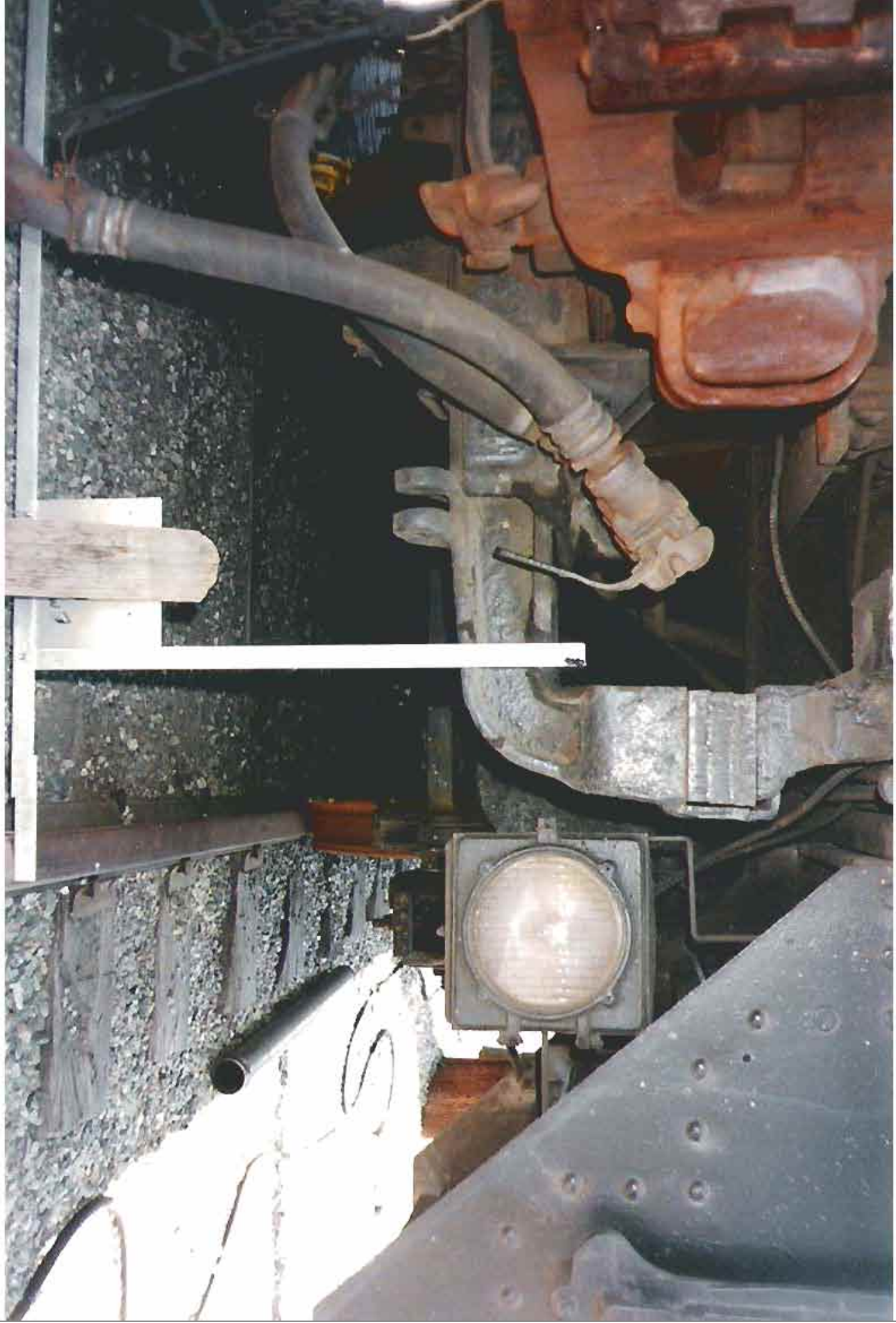


floor at  
stowards  
locker  
with new  
cross stringers

not to  
scale

Pram  
5/93

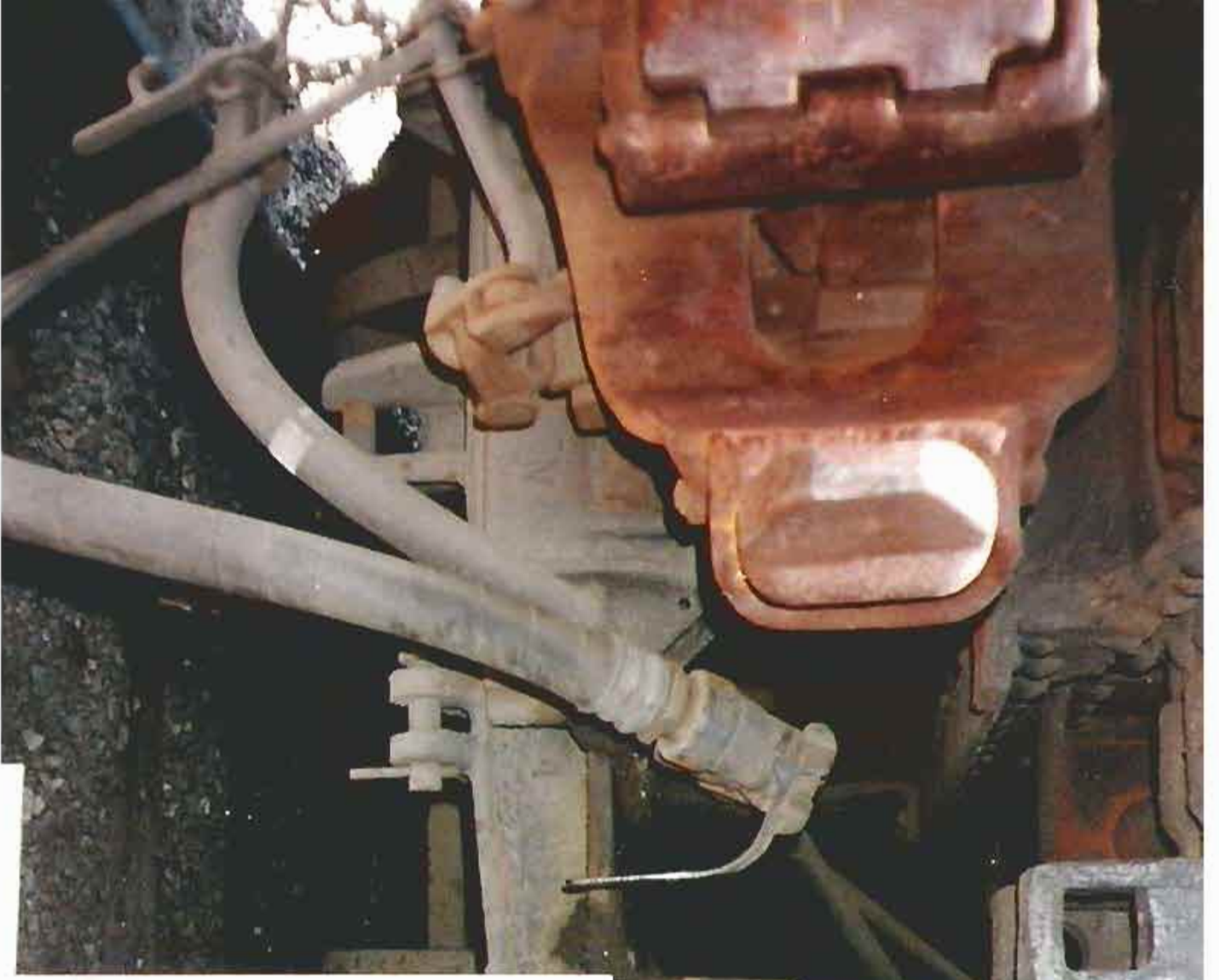






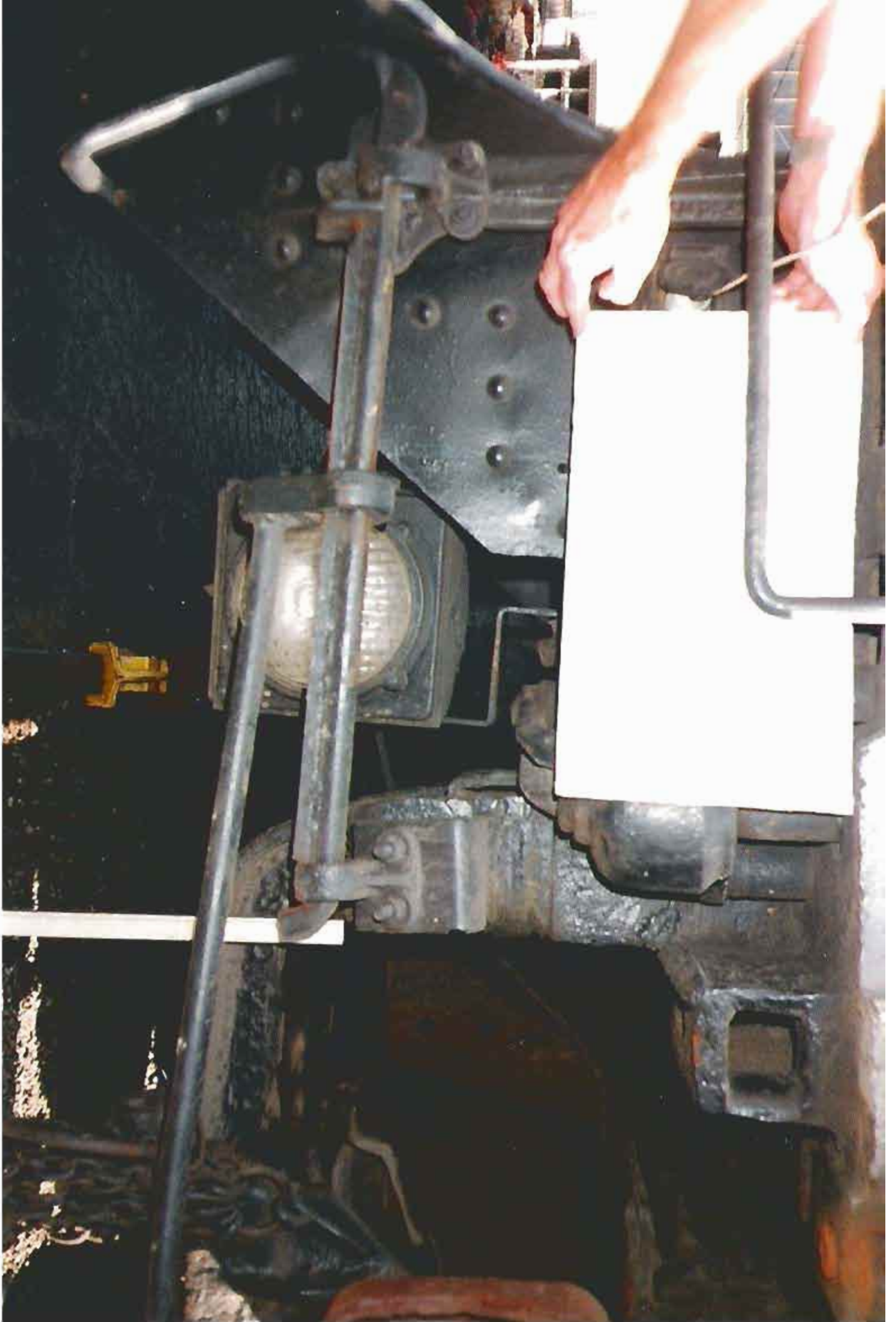














12-18-90

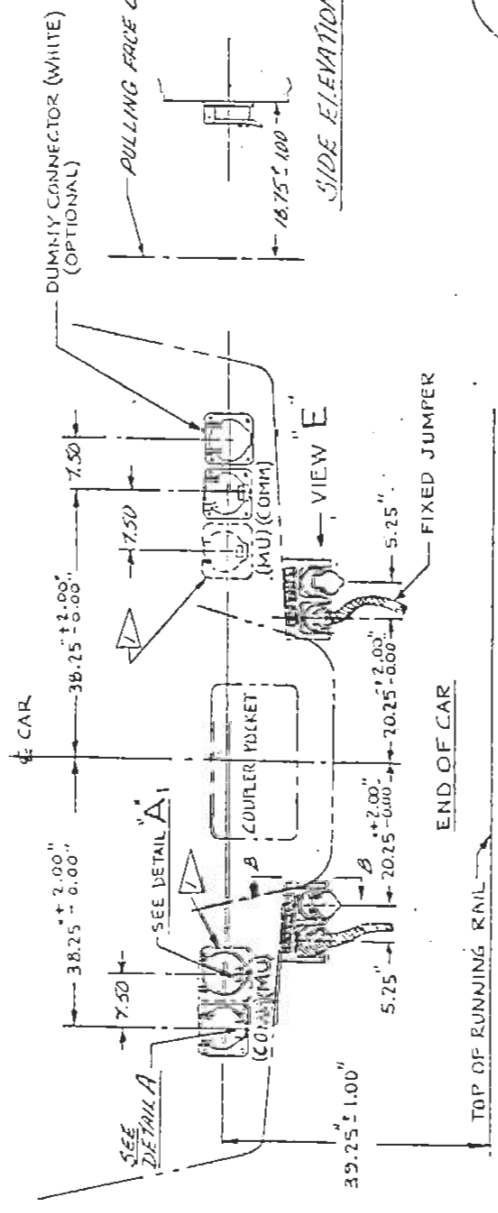


1983  
12-18-90

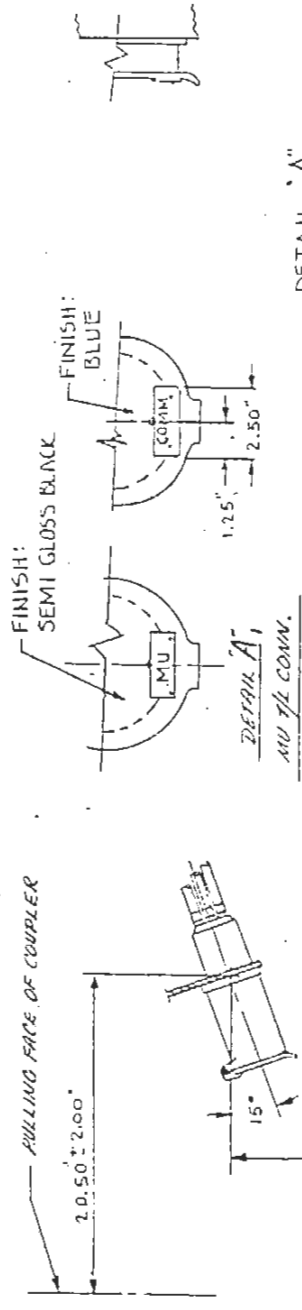
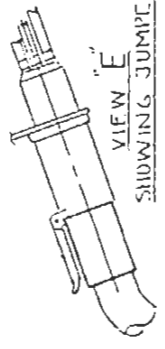


A 177-50-C  
 URBAN 10  
 REV

REV	DESCRIPTION	DATE	APPRD
A	ADDED MU T/L LOCATIONS & 100V FIXED JUMPERS	11/10/11	CRS/CAL



SIDE ELEVATION



DETAIL "A"  
 2 1/4" COMM. COUPL.

**NOTE:**  
 IF ORIGINAL MU TRAINLINES ARE IN-  
 STALLED FOR PUSH-PULL OPERATION,  
 USE LOCATION SHOWN IN DOTTED LINES.  
 SEE DWG. C-01-7169 "ELECTRICAL  
 SCHEMATIC, M U TRAINLINE"

SECTION B-B

THIS DRAWING SUPERSEDES  
 SK-D-112772 (W/O CHANGE)

QTY	PART NUMBER	DESCRIPTION	MATERIAL	MFG/SPEC	PA. ITEM NO	ITEM
		LIST OF MATERIAL				
		REFERENCE DRAWINGS				
		E-01-1306 (480V COMMUN. T/L SCHEMATIC)				
		USED ON				
		QTY/CAR				
		USED ON				

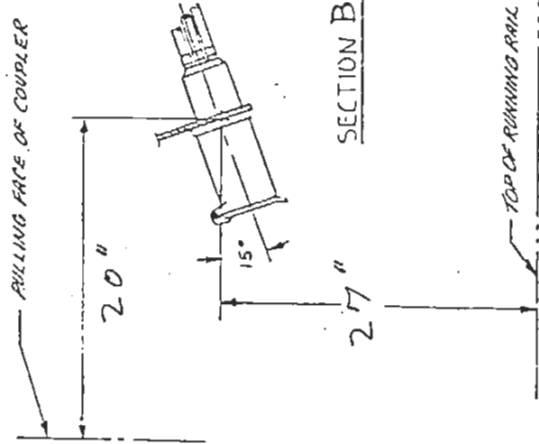
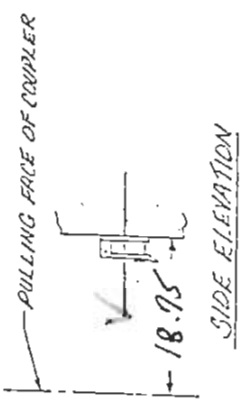
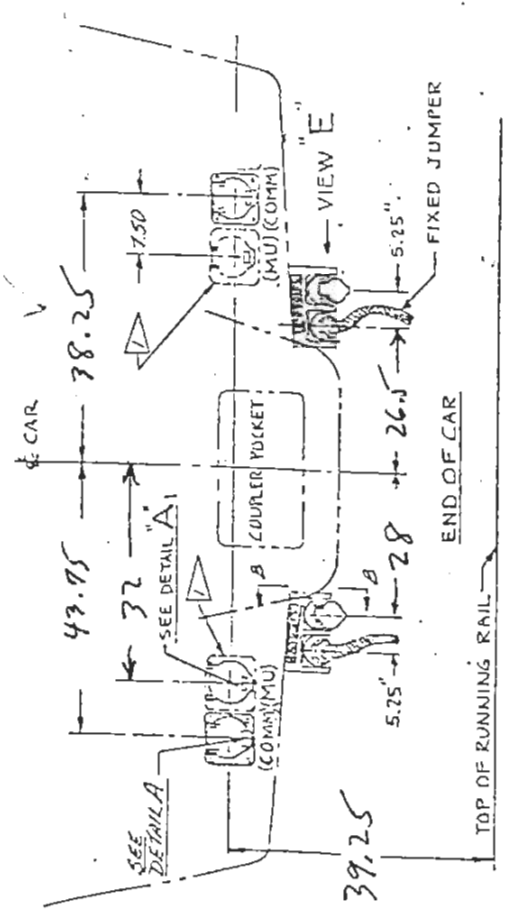
**Amtrak**  
 Equipment Engineering  
 Incorporated by the Federal Railroad Administration  
 480 North Capitol Street, N.W.  
 Washington, D.C. 20014  
 (202) 455-6200  
 TOLL FREE 1-800-455-6200  
 FAX 202-455-6201  
 www.amtrak.com

**END OF CAR TRAINLINE CONNECTOR LOCATIONS (PUSH/PULL CRAS)**

Dir: J. G. A. [Signature]  
 Eng: [Signature]  
 Scale: 1/4" = 1'-0"  
 Date: 11/10/11  
 Rev: 1  
 Project: 177-50-C  
 Drawing: C-05-7171  
 Title: END OF CAR TRAINLINE CONNECTOR LOCATIONS (PUSH/PULL CRAS)

V  
 430  
 C-05-7171  
 10

D C A B A



PVT CAR  
 LA CONDOSA 800178  
 FORWARD END

C-05-7171

DL

NUMBER

REV

A

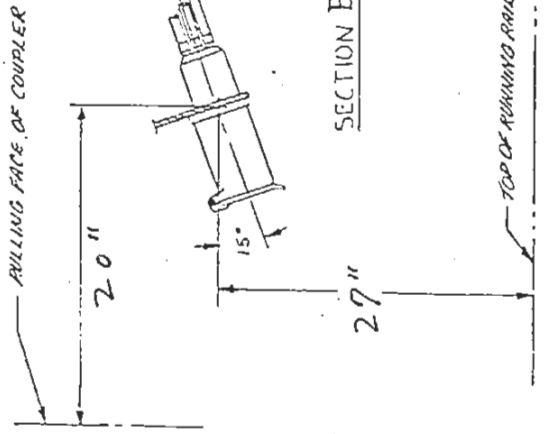
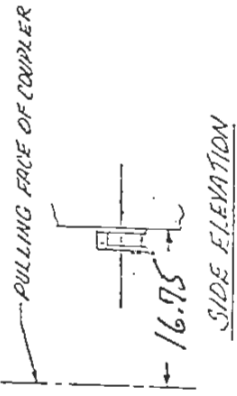
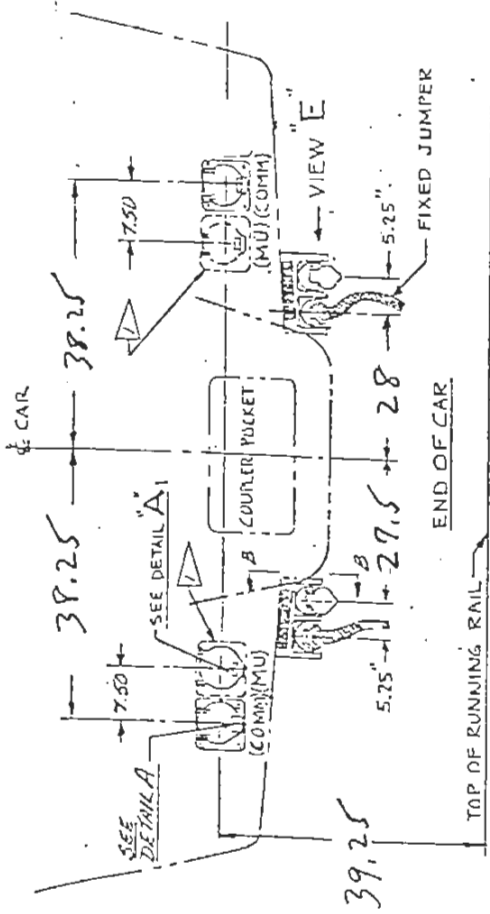
D

C

A

B

A



PVT CAR

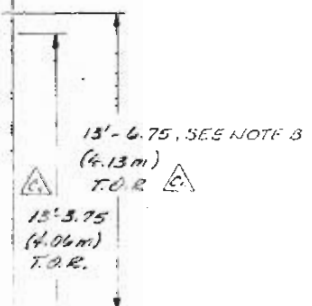
LA CONDOSA 800178

OBS END

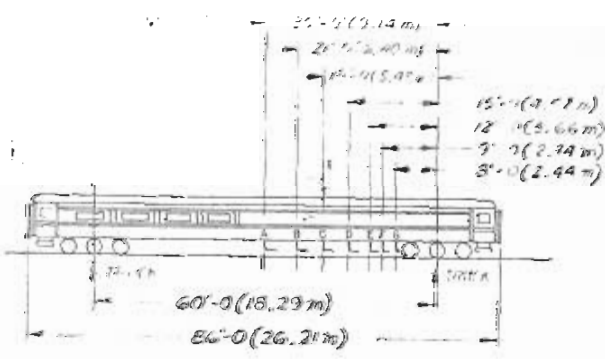
3

4

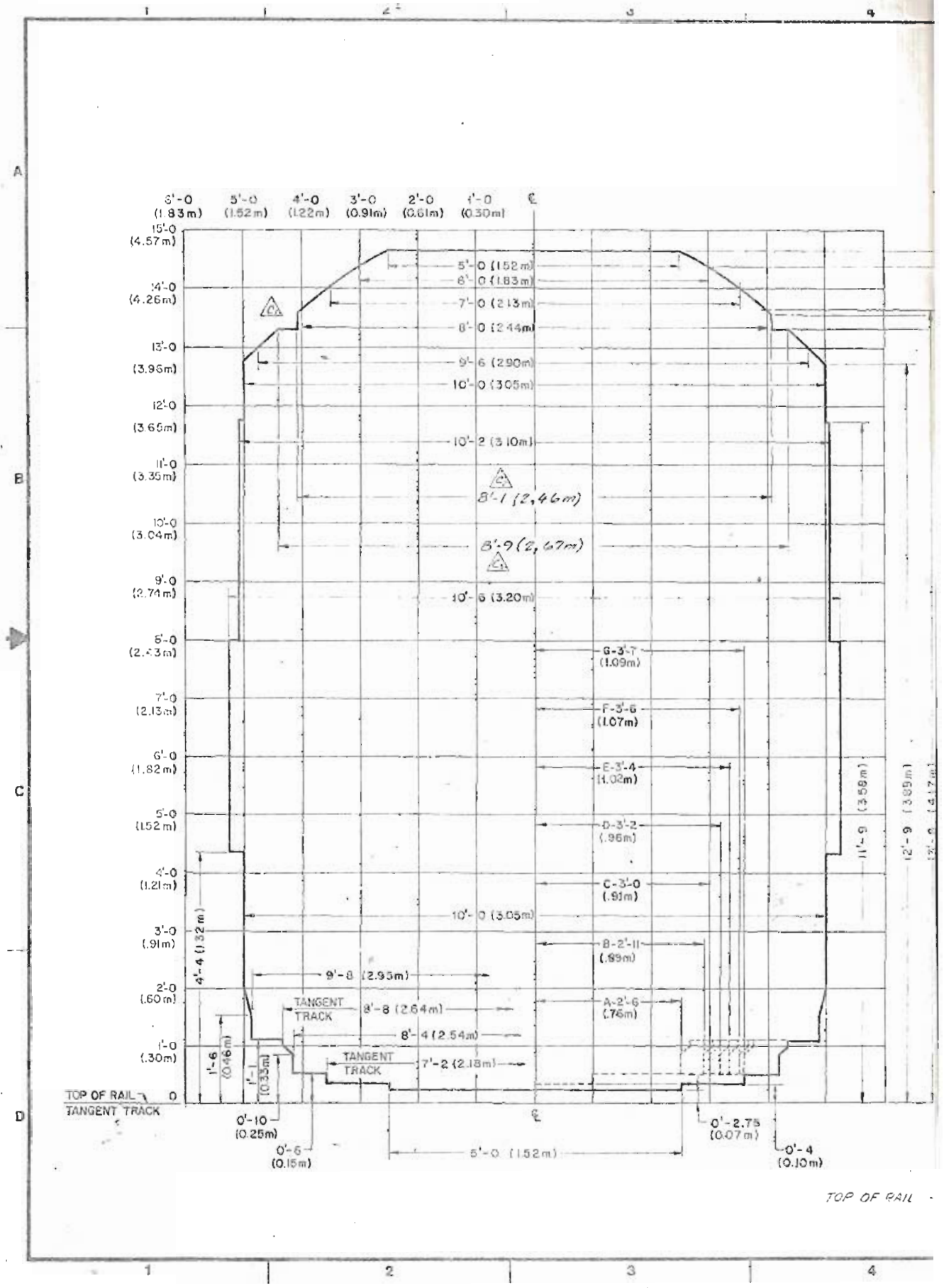
REVISIONS			
LTZ/ZONE	DESCRIPTION	DATE	APP'D
A/0-5	ADDED DIMENSIONS DRAWING	7-12-77	WLS
B/1-2	ADDED DIMENSIONS	12-7-77	BIC
C/474	ADDED CLEARANCE OUT-LINE CHANGE.	MAR	
C/811	ADDED 8'-1 DIMENSION		WLS
C/83	ADDED 8'-5 DIMENSION	22	
C/86	ADDED 13'-5.75 DIMENSION		
C/85	ADDED 13'-6.75 DIMENSION	1978	
	CHANGED PER LTZ/MEMO R.F.L. TO J.J.S. (MARCH 5 '78)		

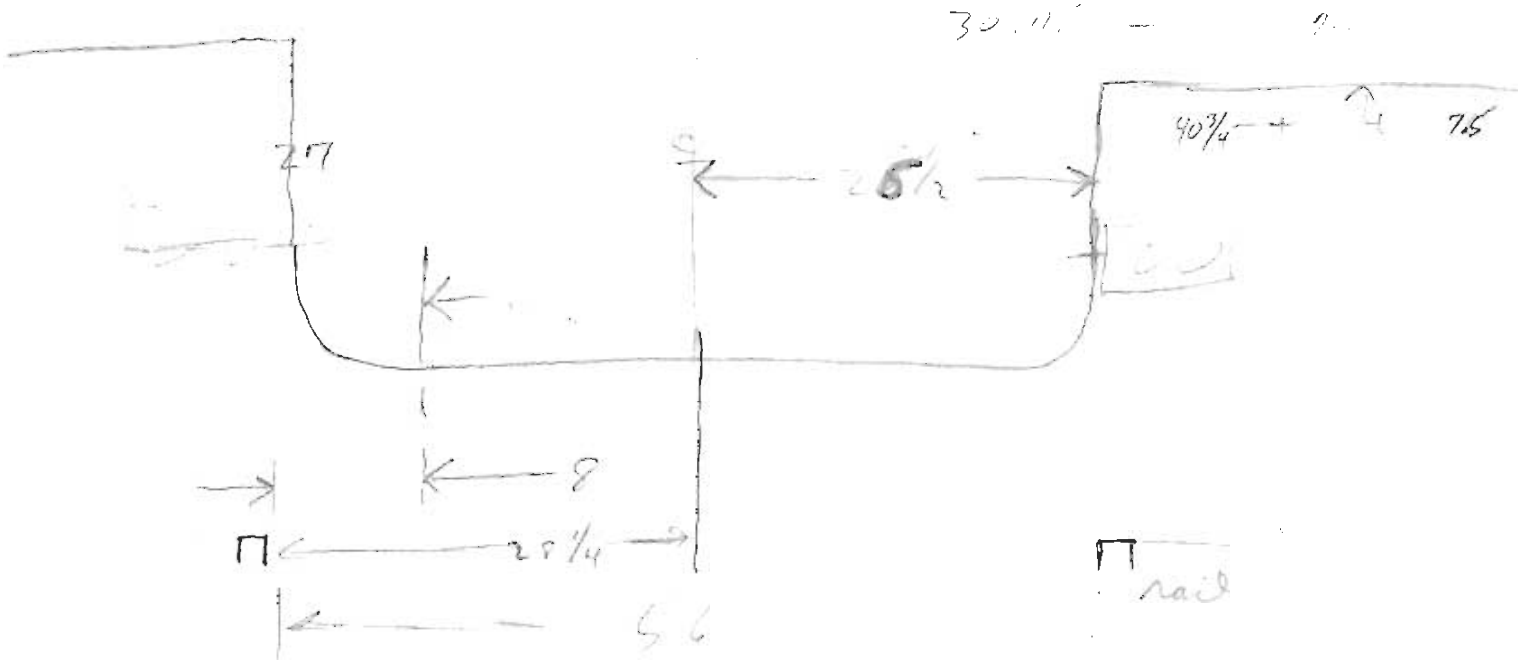


- NOTES:
1. MAXIMUM CLEARANCE LIMITS PERMISSIBLE FOR UNRESTRICTED OPERATION OF PASSENGER CAR EQUIPMENT BETWEEN WOODLAWN JUNCTION AND GRAND CENTRAL TERMINAL, N.Y. HAROLD INTERCHANGE AND PENNSYLVANIA STATION, N.Y. AND ALL NEW HAVEN MAIN LINE OPERATED TRACKAGE.
  2. LIMITING DIMENSIONS ARE BASED ON AN OVERALL CAR LENGTH OF 86'-0" OVER BUFFERS AND DISTANCE CENTER TO CENTER OF TRUCKS NOT EXCEEDING 60'-0" AND INCLUDES ALLOWANCE FOR END OVERHANG AND MIDDLE ORDNATE OF CAR ON CURVE TRACK, TOGETHER WITH ADDITIONAL LEAVE LEAN DISPLACEMENT ALLOWANCE OF 0'-12 1/2" MAX. DUE TO CURVE ELEVATION, FULL BOLSTER LATERAL AND SPRING DEFLECTION FOR A FULLY LOADED CAR IN STANDING POSITION ON CURVE TRACK HAVING 0'-6 1/2" SUPER-ELEVATION.
  3. SOLID LINE DIMENSIONS ARE MAXIMUM ON NEW HAVEN SYSTEM FOR OPERATION ON BOTH CURVE AND TANGENT TRACK AT ALL INDICATED HEIGHTS AND WIDTHS ABOVE TOP OF RAIL AND ALSO APPLY OVER TERMINATED N.Y.C. - P.R.R. TERRITORY BETWEEN HEIGHTS OF 1'-1" AND 14'-8" ABOVE TOP OF RAIL.
  4. SOLID LINE WIDTHS BETWEEN HEIGHTS OF 0'-2 3/4" AND 1'-1" ABOVE TOP OF RAIL ARE MAXIMUM OVER N.Y.C. - P.R.R. TERRITORY OF CAR EQUIPMENT ON TANGENT TRACK AND FOR BODY PARTS LOCATED DIRECTLY OVER TRUCK OR TRUCK PARTS WHICH IN BOTH CASES DO NOT SWING BEYOND SOLID LINE PRESCRIBED LIMITS WHILE IN OPERATION ON CURVE TRACK.
  5. DOTTED LINE LIMITS AS INDICATED INCLUDE ALLOWANCE FOR END OVERHANG AND MIDDLE ORDNATE ON CURVE TRACK FOR OPERATION OF EQUIPMENT PROJECTIONS LOCATED BETWEEN TRUCKS. STRUCTURAL VARIATIONS, WHEEL WEAR END PLAY ETC., MUST BE PROVIDED FOR IN DESIGN OF EQUIPMENT FOR OPERATION IN N.Y.C. - P.R.R. ELECTRIFIED ZONES.
  6. "MV" AND SIMILAR TYPE CARS EQUIPPED WITH CONTACT SHOES MUST BE DESIGNED IN ACCORDANCE WITH A.P.R. (ELECTRICAL SECTION) SPECIFICATIONS, FOR OPERATION IN THIRD RAIL ELECTRIFIED TERRITORY.
  7. ALL UNDER BODY EXHAUSTS, GENERATORS ETC., LOCATED BETWEEN TRUCKS OR ON END OF CAR EQUIPMENT MUST BE WITHIN OFFSET LIMITS AS INDICATED FOR OPERATION IN THIRD RAIL TERRITORY AND HORIZONTAL DISTANCE TO INSIDE FACE OF SUCH PROJECTIONS SHOULD BE MEASURED FROM THE CENTER LINE OF FULLY LOADED CAR IN STANDING POSITION ON TANGENT TRACK.
  8. REVISION 'C' WAS MADE TO ACCOMMODATE CLEARANCE REQUIREMENTS ON TRACKS 15, 17 & 18 IN WASHINGTON TERMINAL.



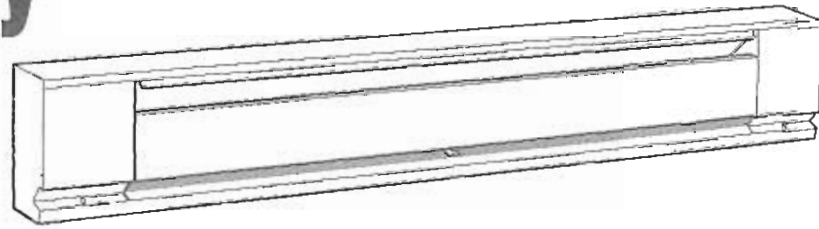
<b>REFERENCE DRAWINGS:</b> N.Y. N.H. & H.R.R. 34148-C	<b>EQUIPMENT ENGINEERING</b>  National Railroad Passenger Corporation 225 E Street, Washington, D.C. 20541	<b>CLEARANCE DIAGRAM</b> <b>ELECTRIFIED &amp; THIRD RAIL</b>
DATE: 6 JULY 77 DRAWN BY: WLS CHECKED BY: WLS APPROVED BY: WLS	SCALE: 1/8" = 1'-0" SHEET NO: 1 OF 1	PROJECT NO: D-322   C





$26\frac{1}{4}$

$2.12$   
 $1.11$   
 $4.66$



File #E37116

# Electric Baseboard Heaters

## 1800, 2500, C1800 & C2500 Series

### *Installation & Maintenance Instructions*

Dear Owner,

*Congratulations! Thank you for purchasing this new heater manufactured by a division of Marley Engineered Products. You have made a wise investment selecting the highest quality product in the heating industry. Please carefully read the installation and maintenance instructions shown in this manual. You should enjoy years of efficient heating comfort with this product from Marley Engineered Products... the industry's leader in design, manufacturing, quality and service.*

*... The Employees of  
Marley Engineered Products*

### **WARNING**

**Read Carefully** - This Instruction Sheet contains vital information for the proper installation, use, and efficient operation of the heater. Carefully read the manual before installation, operation, or cleaning of the heater. Failure to adhere to the instructions could result in fire, electric shock, death, serious personal injury, or property damage. Save these instructions and review frequently for continuing safe operation and instructing future users.

1. Keep all electrical cords, foam filled articles, drapes, bedding, and other household furnishings away from contact with heater. It is recommended all items be kept a minimum of six (6") inches (152mm) from heater.
2. Do not install baseboard heater below electrical convenience receptacles (outlets).
3. Do not install baseboard heater against vinyl wallpaper, paperboard or low density fiberboard surface. Do not install vinyl drapes or vinyl blinds above heater.
4. Do not recess heater in wall.
5. The installation must comply with applicable Local and National Electrical Codes and utility requirements.
6. Do not remove or by-pass thermal cutout.
7. To reduce the risk of fire, do not store or use gasoline or other flammable vapors and liquids in the vicinity of the heater.
8. Personal injury or death could result from electric shock. Disconnect all power to heater at main panel before attempting to install or service this heater.
9. Supply voltage must be the same as heater voltage. Check heater nameplate and supply voltage before energizing.
10. When using RSA Transformer Relay Accessory, supply wiring must be suitable for 90°C.

## Heater Ampere Rating.

Residential Model No.	Commercial Model No.	120 Volt	208 Volt	240 Volt	277 Volt	347 Volt	600 Volt
1812*	C1812*	3.1	-	-	-	-	-
1813*	C1813*	4.7	-	-	-	-	-
1814*	C1814*	6.3	-	-	-	-	-
1815*	C1815*	7.8	-	-	-	-	-
1816*	C1816*	9.4	-	-	-	-	-
-	C1873*	-	-	1.8	2.0	-	-
-	C1874*	-	-	2.4	2.7	-	-
-	C1875*	-	-	2.9	3.4	-	-
-	C1876*	-	-	3.5	4.1	-	-
-	C1878*	-	-	4.7	5.4	-	-
-	C1870*	-	-	5.9	6.8	-	-
2512*	-	3.3	-	-	-	-	-
25126*	C25126*	4.2	-	-	-	-	-
2513*	C2513*	6.3	-	-	-	-	-
2514*	C2514*	8.3	-	-	-	-	-
2515*	C2515*	10.4	-	-	-	-	-
2516*	C2516*	12.5	-	-	-	-	-
2502*	-	-	1.9	-	-	-	-
25026*	C25026*	-	2.4	-	-	-	-
2503*	C2503*	-	4.6	-	-	-	-
2504*	C2504*	-	6.0	-	-	-	-
2505*	C2505*	-	7.2	-	-	-	-
2506*	C2506*	-	9.6	-	-	-	-
2507*	C2507*	-	8.4	-	-	-	-
2508*	C2508*	-	12.0	-	-	-	-
2500*	C2500*	-	12.0	-	-	-	-
2542*	-	-	1.4	1.7	-	-	-
25426*	C25426*	-	1.9	2.1	-	-	-
2543*	C2543*	-	2.7	3.1	-	-	-
2544*	C2544*	-	3.6	4.2	-	-	-
2545*	C2545*	-	4.5	5.2	-	-	-
2546*	C2546*	-	5.4	6.3	-	-	-
2547*	C2547*	-	6.3	7.3	-	-	-
2548*	C2548*	-	7.2	8.3	-	-	-
25408*	C25408*	-	8.7	10.4	-	-	-
2540*	C2540*	-	8.7	10.4	-	-	-
2572*	-	-	1.1	1.2	1.4	-	-
25726*	C25726*	-	1.4	1.6	1.8	-	-
2573*	C2573*	-	2.0	2.4	2.7	-	-
2574*	C2574*	-	2.7	3.1	3.6	-	-
2575*	C2575*	-	3.4	3.9	4.5	-	-
2576*	C2576*	-	4.1	4.7	5.4	-	-
2577*	C2577*	-	4.7	5.5	6.3	-	-
2578*	C2578*	-	5.4	6.3	7.2	-	-
25708*	C25708*	-	6.8	7.5	8.0	-	-
2570*	C2570*	-	6.5	7.5	8.0	-	-
25326*	C25326*	-	-	-	-	1.4	-
2533*	C2533*	-	-	-	-	2.0	-
2534*	C2534*	-	-	-	-	3.0	-
2535*	C2535*	-	-	-	-	4.3	-
2536*	C2536*	-	-	-	-	5.0	-
2537*	C2537*	-	-	-	-	5.9	-
2538*	C2538*	-	-	-	-	7.2	-
25308*	C25308*	-	-	-	-	7.2	-
2530*	C2530*	-	-	-	-	7.2	-
2564*	C2564*	-	-	-	-	-	1.7
2565*	C2565*	-	-	-	-	-	2.1
2566*	C2566*	-	-	-	-	-	2.5
2567*	C2567*	-	-	-	-	-	2.9
2568*	C2568*	-	-	-	-	-	3.3
25608*	C25608*	-	-	-	-	-	4.2
2560*	C2560*	-	-	-	-	-	4.2

\* Followed by WC or NWC suffix

Total Amps	Minimum AWG. Wire Size (Copper)	Circuit Breaker or Fuse Size
0 thru 12	#14	15 amp
12.1 thru 16	#12	20 amp
16.1 thru 24	#10	30 amp

NET VOLUMES OF WIRING COMPARTMENT		
DESCRIPTION	CUBIC INCHES	CUBIC CENTIMETERS
Heater Only (Each Wiring Compartment)	14.96	241
Heater W/SP Thermostat	11.18	180
Heater W/DP Thermostat	11.18	180
Heater W/Heat-Cool Switch Receptacle	9.51	153
Heater W/Duplex Receptacle	11.18	180
Heater W/DP Disconnect Switch	11.18	180
Heater W/Power Relay	10.76	174
Heater W/Transformer Relay	2.93	47

This Heater is designed to provide years of efficient, trouble free operation as a primary or supplementary heat source for residential and commercial applications. Baseboard heaters must be thermostatically controlled for efficient, safe operation. A thermostat is not provided with this heater. However, a single or double

pole thermostat accessory is available for installation into this heater at your place of purchase, or the heater may be connected to any suitable wall mounted thermostat that will meet the electrical load requirements. Installation or use of this product in any manner not described herein will void the warranty and could result in injury, damage to property, or permanent damage to heater.

### UNPACKING HEATER

Check heater to make sure it has not been damaged in shipping. Do not install or attempt to operate the heater if damaged. Return to place of purchase or file claim with freight carrier.

### NOTICE TO OWNERS

Certain fabrics discolor in time from indirect sunlight and normal room temperature - mostly organic and synthetic material. They will discolor more rapidly when exposed to direct sunlight and warm currents. Hang drapes to provide minimum of 2 in.(51mm) air space between heater front and nearest drape fold as shown in Example 1 Figure 1, or 6 in.(153mm) airspace between top of heater and bottom of drapes as shown in Example 2, Figure 1. Allow minimum clearance of 1 in. (26mm) from drapes to ceiling and to top of floor covering to permit air circulation as shown in Example 1, Figure 1.

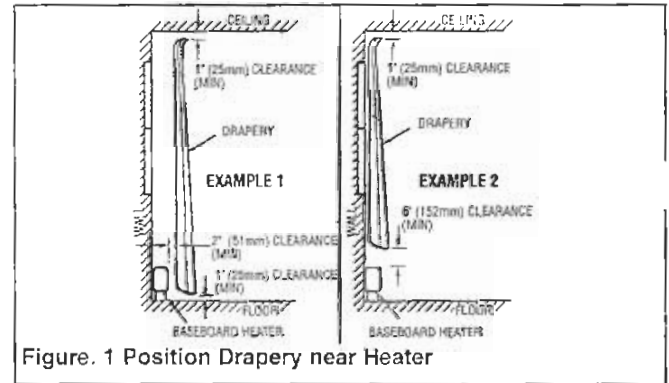


Figure. 1 Position Drapery near Heater

### INSTALLATION

#### FLOORS & CARPETING:

Heaters may be mounted directly on any floor surface, including carpeting. Where wall-to-wall carpets are installed after the baseboard installation, the carpeting can be run up to the front and around the heater body, providing it does not obstruct air flow. (Maximum 3/4" (19mm) thick).

1. Remove wiring compartment cover at end of heater where power supply cable is to enter. Determine desired mounting location (Figure 2), position heater to wall as intended and mark wall (or floor) at location where power supply is to enter heater.

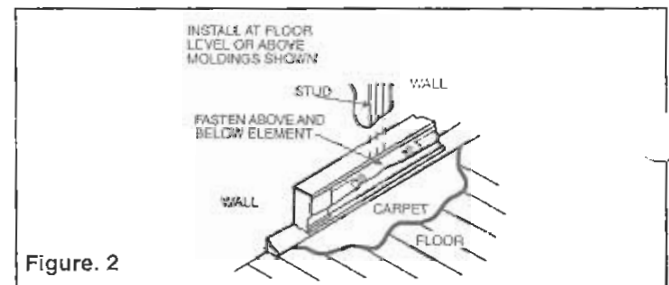


Figure. 2



NOTE: Make sure the caution label with the word "TOP" is at the top of the heater. For most efficient operation locate heaters along outside wall under windows. Position heater so it can be secured to wall stud. Power cable must enter heater through one of the knockouts provided in wiring compartment. See Figure 3.

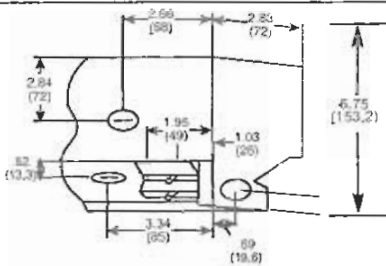


Figure 3 Wiring Compartment Dimensions

2. Drill hole in wall (or floor) at desired location for power supply entry. Install power supply wiring to heater and thermostat location as determined by thermostat option selected. Allow approximately 10 to 12in(254mm to 305mm) of wire at heater for connections.
3. If any other Marley accessories are to be used with this heater, refer to installation instructions provided with the accessory for proper installation and wiring.
4. Wireway Cover - Commercial Baseboard Only
  - a. The wireway cover is a factory installed feature of Marley commercial baseboard heaters. Two cables or four individual conductors plus two ground wires may be routed through the wireway. Refer to page 2 for maximum current loads.
  - b. To gain access to wireway, lay heater face down and remove two screws as shown in Figure 4. Remove the knockouts in the channel areas of both terminal boxes.
  - c. Insert the plastic bushings from the parts kit (in wiring compartment) in the knockout holes.
  - d. Wire heater according to Figure 5. Reattach the wireway cover using the two screws.
5. Loosen screw in built-in cable clamp or remove desired knockout from heater wiring compartment (Figures 3 and 4). Install power cable into wiring compartment allowing at least 6in(153mm) of cable for connection to heater. To install two power cables using the built-in cable clamp, bend tab covering second hole up and back to rear wall of wiring compartment. If built-in cable clamp is not used, install approved cable connector (not included) in desired knockout.
6. Position heater to wall (use mounting holes as a guide, see Figure 4) and secure through the top row of predrilled mounting holes using at least two fasteners, one at each end of the heater. If the unit is mounted above the floor to allow carpet installation under the heater, two additional mounting holes are supplied at each end below the element. This will allow you to screw into the sill plate if the unit does not span across two wall studs.

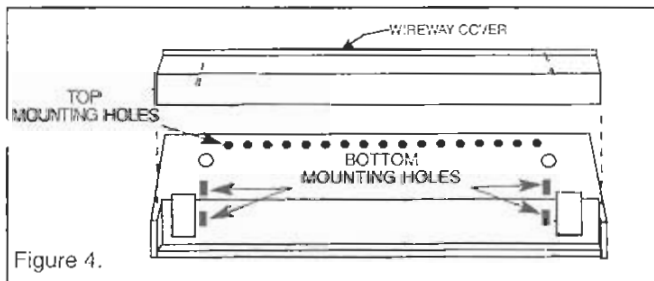


Figure 4.

! **CAUTION** ⚡

When using bottom mounting holes, (to prevent a possible shock or fire hazard,) make sure you do not drive the screws through or damage the power supply wire.

7. Connect the supply cable grounding wire to the bare copper pigtail in wiring compartment.
8. After making sure the electrical power coming to the heater is turned off at main switch panel follow the desired wiring diagram, as shown in Figure 5, to connect the power supply to the heater using approved wire nuts.

! **WARNING**

To prevent a possible fire, make sure all wire connections are tight.

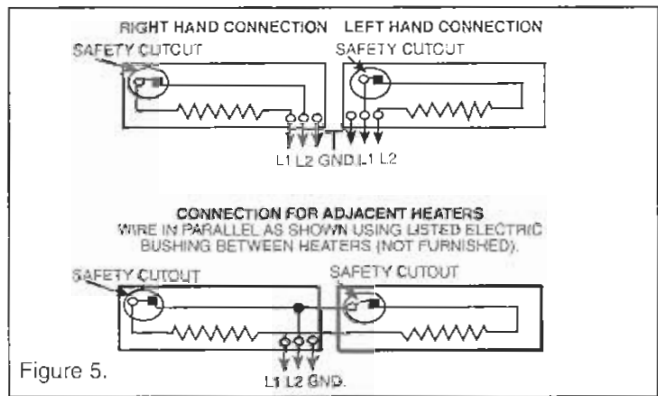


Figure 5.

NOTE: When accessories are installed, use wiring diagram supplied with the accessory.

9. If front cover was removed, reinstall by hooking the top edge on the support bracket(s). Then push down to latch onto the support bracket(s).
10. Replace wiring compartment cover.
11. Follow instructions accompanying thermostat for installation and wiring thermostat. See Figure 6 for typical thermostat wiring diagrams.

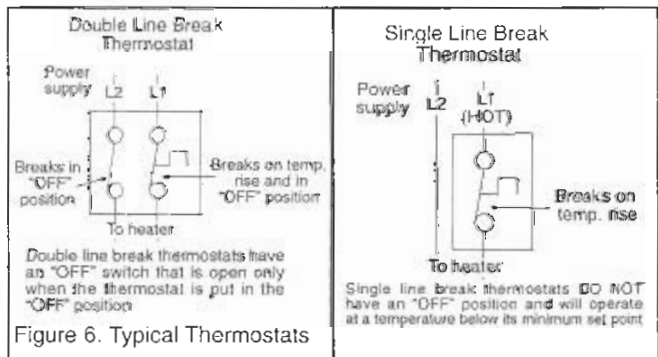


Figure 6. Typical Thermostats

### OPERATION

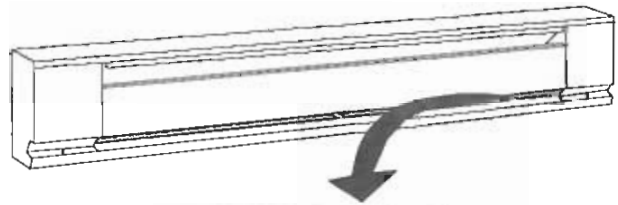
1. After the baseboard system has been completely installed, all thermostats should be turned to LOW or NO HEAT. Then turn on breakers. Wait 3 to 5 minutes and check to see that none of the heaters are operating. If operating, disconnect power and check wiring. If none are operating then turn thermostats to highest position and wait 3 to 5 minutes. Check to see that all heater(s) are operating. Should any not be operating, disconnect power and check wiring.
2. Allow entire system to operate steadily for 1/2 hour. This should remove oily residue from manufacturing. (Some smoking may occur).
3. Select the setting for comfort on all thermostats.

### CLEANING

Because of the convection heating principle which depends on air circulation through the finned element, dust will collect between the fins. The heater should be cleaned regularly for maximum efficiency. Before cleaning be sure the heater is off and the element is cool. A vacuum cleaner with a brush attachment may be used for cleaning. The finish of the heater may be cleaned with a slightly damp rag if desired.

### PAINTING

Painting of this baseboard is not necessary unless to match room decor. To paint, first rough up the exterior with steel wool. Paint only the exterior of the cabinet. Do not allow paint on the element and high limit capillary tube. Use a high quality enamel paint.



### NAMEPLATE

MODEL NO. <b>C2570WC</b>	DATE CODE <b>1294</b>	
VOLTS AC <b>277/240/208</b>	60HZ WATTS <b>25 X (150) /1450</b>	AMPS <b>9.1/8.0/7.0</b>
MARLEY ELECTRIC HEATING BENNETTSVILLE, SC 29512		UL c UL 54E1 LISTED BASEBOARD HEATER PATENT PENDING 4104-2109-265

### LIMITED WARRANTY

All products manufactured by Marley Engineered Products are warranted against defects in workmanship and materials for one year from date of installation, except heating elements which are warranted against defects in workmanship and materials for ten years from date of installation. This warranty does not apply to damage from accident, misuse, or alteration; nor where the connected voltage is more than 5% above the nameplate voltage; nor to equipment improperly installed or wired or maintained in violation of the product's installation instructions. All claims for warranty work must be accompanied by proof of the date of installation.

The customer shall be responsible for all costs incurred in the removal or reinstallation of products, including labor costs, and shipping costs incurred to return products to Marley Engineered Products Service Center. Within the limitations of this warranty, inoperative units should be returned to the nearest Marley authorized service center or the Marley Engineered Products Service Center, and we will repair or replace, at our option, at no charge to you with return freight paid by Marley. It is agreed that such repair or replacement is the exclusive remedy available from Marley Engineered Products.

THE ABOVE WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED, AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WHICH EXCEED THE AFORESAID EXPRESSED WARRANTIES ARE HEREBY DISCLAIMED AND EXCLUDED FROM THIS AGREEMENT. MARLEY ELECTRIC HEATING SHALL NOT BE LIABLE FOR CONSEQUENTIAL DAMAGES ARISING WITH RESPECT TO THE PRODUCT, WHETHER BASED UPON NEGLIGENCE, TORT, STRICT LIABILITY, OR CONTRACT.

Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above exclusion or limitation may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

For the address of your nearest authorized service center, contact Marley Engineered Products in Bennettsville, SC, at 1-800-642-4328. Merchandise returned to the factory must be accompanied by a return authorization and service identification tag, both available from Marley Engineered Products. When requesting return authorization, include all catalog numbers shown on the products.

### HOW TO ORDER REPAIR PARTS

In order to obtain any needed repair or replacement parts, warranty service or technical information, please contact Marley Engineered Products Service Center toll-free by calling 1-800-642-HEAT.

When ordering repair parts, always give the information listed as follows:

1. The Part Number
2. The Model Number
3. The Part Description
4. Date of Manufacture



**Marley**  
Engineered Products

470 Beauty Spot Road East  
Bennettsville, SC 29512 USA



# OPERATING INSTRUCTIONS

## LINE VOLTAGE THERMOSTAT

### MODEL 2E158A

FORM  
551370  
02966

### READ AND SAVE THESE INSTRUCTIONS

0988/269  
VP

READ INSTRUCTIONS CAREFULLY BEFORE ATTEMPTING TO INSTALL OR OPERATE THE DAYTON LINE VOLTAGE THERMOSTAT.  
RETAIN INSTRUCTIONS FOR FUTURE REFERENCE.

#### Description

The Dayton line voltage thermostat Model 2E158A is designed for control of either heating or cooling. The sensitive bi-metal operated snap action switch provides control for resistive or inductive loads. The metal base mounts directly to standard outlet box and needs no special leveling or mounting plate.

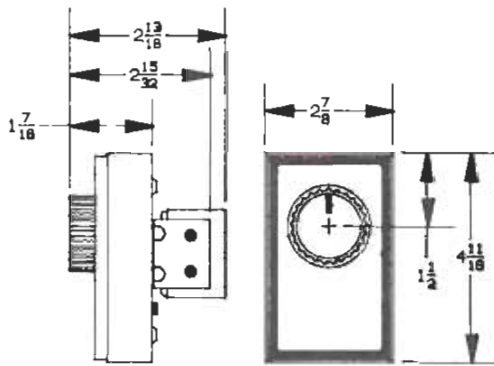


Figure 1 Dimensions

#### Specifications

Switch action ..... { Snap action-single pole  
double throw (SPDT)  
Electrical ratings:  
Heating (22 amp, 125-277VAC) { 3/4 HP, 125VAC  
1 1/2 HP, 250/277VAC  
Cooling ..... { 3/4 HP, 125VAC  
1 1/2 HP, 250/277VAC  
Temperature setting range ..... 50°F-90°F  
Fixed differential ..... { Heating: 2°F nominal  
Cooling: 4°F nominal  
Max. ambient temperature ..... 150°F  
Approval ..... UL Listed

#### General Safety Information

**WARNING: READ CAREFULLY BEFORE ATTEMPTING TO INSTALL, OPERATE OR SERVICE THE DAYTON LINE VOLTAGE THERMOSTAT. PROTECT YOURSELF AND OTHERS BY OBSERVING ALL SAFETY INFORMATION AND ADDITIONAL INSTRUCTIONS. FAILURE TO COMPLY WITH INSTRUCTIONS COULD RESULT IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.**

1. Make certain that the electrical ratings of the thermostat conform to the power source and to the load being controlled. Disconnect all power before installing or servicing. If the power disconnect is out of sight, lock it in the open position and tag it to prevent unexpected application of power. Failure to do so could result in fatal electric shock.

**WARNING: DO NOT DEPEND UPON THE THERMOSTAT AS THE SOLE MEANS OF DISCONNECTING POWER WHEN INSTALLING OR SERVICING THE PRODUCT IT IS CONTROLLING. ALWAYS DISCONNECT POWER AT THE MAIN CIRCUIT BREAKER AS DESCRIBED ABOVE.**

2. This thermostat is intended ONLY for permanent installation in an approved electrical box which has been installed and wired in accordance with the National Electrical Code (NEC) and all applicable local codes and ordinances. All wiring should be done by a qualified electrician, using copper wire only.
3. This thermostat is intended for general heating or cooling ONLY. It must NOT be used in potentially dangerous locations such as flammable, explosive, chemical-laden or wet atmospheres.

**CAUTION: In cases in which property damage may result from malfunction of the thermostat, a backup system should be used.**

#### Specifications

**DAYTON ONE-YEAR LIMITED WARRANTY.** Line voltage thermostat, Model 2E158A, is warranted by Dayton Electric Mfg. Co. (Dayton) to the original user against defects in workmanship or materials under normal use for one year after date of purchase. Any part which is determined by Dayton to be defective in material or workmanship and returned to an authorized service location, as Dayton designates, shipping costs prepaid, will be, as the exclusive remedy, repaired or replaced at Dayton's option. For limited warranty claim procedures, see PROMPT DISPOSITION below. This limited warranty gives purchasers specified legal rights which vary from state to state.

**LIMITATION OF LIABILITY.** To the extent allowable under applicable law, Dayton's liability for consequential and incidental damages is expressly disclaimed. Dayton's liability in all events is limited to, and shall not exceed, the purchase price paid.

**WARRANTY DISCLAIMER.** Dayton has made a diligent effort to illustrate and describe the product in this literature accurately; however, such illustrations and descriptions are for the sole purpose of identification, and do not express or imply a warranty that the product is merchantable, or fits a particular purpose, or that the product will necessarily conform to the illustrations and descriptions.

Except as provided below, no warranty or affirmation of fact, expressed or implied, other than as stated in "LIMITED WARRANTY" above is made or authorized by Dayton.

**PRODUCT SUITABILITY.** Many states and localities have codes and regulations governing sales, construction, installation, and/or use of products for certain purposes, which may vary from those in neighboring areas. While Dayton attempts to assure that its products comply with such codes, it cannot guarantee compliance, and cannot be responsible for how the product is installed or used. Before purchase and use of a product, please review the product application, and national and local codes and regulations, and be sure that the product, installation, and use will comply with them.

Certain aspects of disclaimers are not applicable to consumer products; e.g., (a) some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you; (b) also, some states do not allow limitations on how long an implied warranty lasts, consequently the above limitation may not apply to you; and (c) by law, during the period of the Limited Warranty, any implied warranties of merchantability or fitness for a particular purpose applicable to consumer products purchased by consumers, may not be excluded or otherwise disclaimed.

**PROMPT DISPOSITION.** Dayton will make a good faith effort for prompt correction or other adjustment with respect to any product which proves to be defective within limited warranty. For any product believed to be defective within limited warranty, first write or call dealer from whom product was purchased. Dealer will give additional directions. If unable to resolve satisfactorily, write to Dayton at address below, giving dealer's name, address, date and number of dealer's invoice, and describing the nature of the defect. Title and risk of loss pass to buyer on delivery to common carrier. If product was damaged in transit to you, file claim with carrier.

**WARNING:** If this product is used to replace a device containing mercury, the purchaser or consumer must ensure that the mercury is properly managed to comply with state or federal regulations. The mercury must not become part of solid waste or waste water. Additional guidance may be obtained from the manufacturer of the product being removed or by calling the Materials Manager. (OUTSIDE TN, 1-800-251-7828) (INSIDE TN, 1-615-538-6181)

Manufactured for Dayton Electric Mfg. Co., 5959 W. Howard St., Chicago, IL 60648

Installation

FOR HEATING

NOTE:

If used in 120V circuit, thermostat should interrupt the hot (black) line. Some codes require a double pole disconnect for 208-240-277V circuits. Check before installing this thermostat.

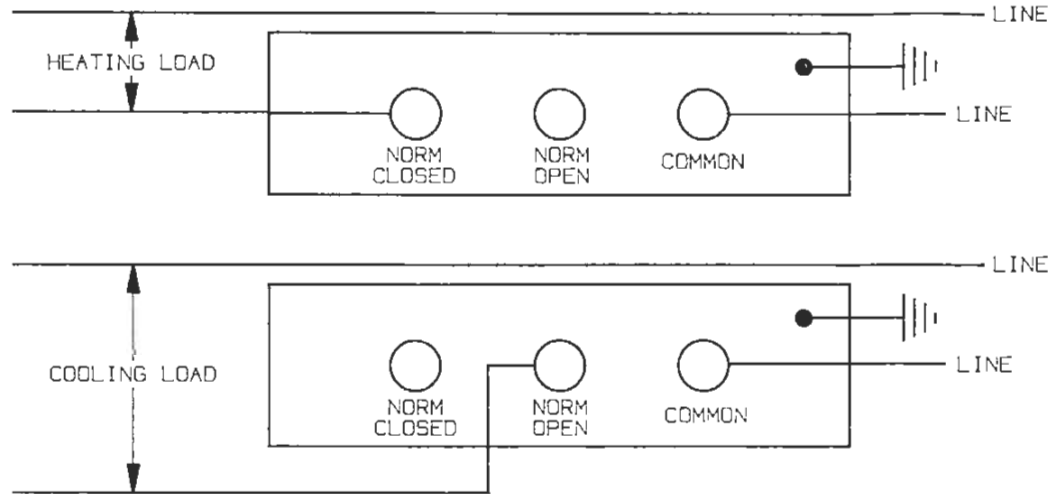


Figure 2 Wiring Diagrams

SPDT Switch action may be used for either heating or cooling. It cannot be used for combination heating and cooling without a remote heating-cooling switch.

For Cooling: Wire line to common; wire load to normally open.

For Heating: Wire line to common; wire load to normally closed.

1. Turn OFF power. Remove the cover by pulling straight forward from base. Connect the wires to the proper terminals.
2. Assemble thermostat to outlet box using the screws provided. The slotted hole in the base will allow unit to be aligned properly. Once thermostat is mounted, removing the cover will be completely safe as no wires are exposed.

NOTE: Exercise care when fitting thermostat into outlet box so that no pressure is brought to bear upon the bimetal. Distortion of the bi-metal will cause the thermostat to function improperly. Ensure knob is fully counterclockwise prior to mounting.

3. Snap cover back in place and turn ON power. Turn knob and set for proper temperature operation.

LOCATION

The location of the thermostat is extremely important in order to control the temperature accurately. For best results it should be located:

1. On an inside wall of least 3' from the outside wall.
2. Approximately 54" above the floor.
3. Where there is free circulation of air.

DO NOT LOCATE Thermostat:

1. Where air circulation is poor.
2. Next to heat ducts or hot water pipes.
3. Close to heat outlets, fireplaces, or direct sunlight.
4. Where operation can be affected by heating or drying appliances.
5. In cold areas, such as below windows, stair-wells or next to cold air returns.
6. Where curtains or drapes will cover the thermostat.

Troubleshooting Chart

SYMPTOM	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
Cooling unit or fan does not operate.	1. Improper wiring. 2. Thermostat dial set above space temperature.	1. Check wiring. 2. Set dial to lower temperature.
Cooling unit or fan runs continuously.	1. Improper wiring. 2. Thermostat dial set below space temperature.	1. Check wiring. 2. Set dial to higher temperature.
System operates in reverse.	Improper wiring.	Check wiring.
Heating unit does not operate.	1. Improper wiring. 2. Thermostat dial set below space temperature.	1. Check wiring. 2. Set dial to higher temperature.
Heating unit runs continuously.	1. Improper wiring. 2. Dial set above space temperature.	1. Check wiring. 2. Set dial to lower temperature.



**WHITE-RODGERS**

**1A65/1A65W**  
ELECTRIC-HEAT THERMOSTAT  
(Single Pole)  
**INSTALLATION INSTRUCTIONS**

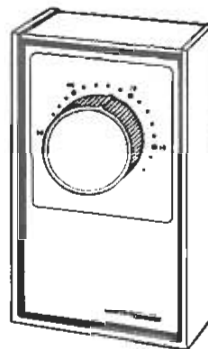
**Operator: Save these instructions for future use!**

**FAILURE TO READ AND FOLLOW ALL INSTRUCTIONS CAREFULLY BEFORE INSTALLING OR OPERATING THIS CONTROL COULD CAUSE PERSONAL INJURY AND/OR PROPERTY DAMAGE.**

**DESCRIPTION**

The Type 1A65/1A65W Electric Heat Thermostat is designed for use on all types of electrical heating installations such as cable heat, baseboards, wall insert heaters, etc. Its narrow operating differential and the ability of its fully exposed knob to sense both radiant heat and room air temperature make this control ideal for use on such installations.

**Dial Setting:** Knob may be set anywhere between 40° and 85°F by simply turning knob so that indicator on knob points to the desired setting.



*Shower*

**PRECAUTIONS**

This control is a precision instrument, and should be handled carefully. Rough handling or distorting components could cause the control to malfunction. **Take care not to push or damage the knob sensing element during installation.**

All wiring must conform to local and national electrical codes and ordinances.

**CAUTION**

To prevent electrical shock and/or equipment damage, disconnect electric power to system, at main fuse or circuit breaker box, until installation is complete.

**WARNING**

Do not use on circuits exceeding specified voltages. Higher voltages will damage control and could cause shock or fire hazard.

Do not use on inductive loads. Inductive (motor) loads will damage control and could cause shock or fire hazard.

**SPECIFICATIONS**

**Switch Rating:** Non-Inductive  
22A (2500W) 120 VAC  
22A (5000W) 240 VAC  
18A (5000W) 277 VAC

**Temperature Range:** 40° to 85°F  
**Differential:** 1°F  
**Switch Action:** Open on rise  
**Contact Structure:** SPST

**INSTALLATION**

If the heating equipment manufacturer has made provisions or recommendations for the location of this control, then follow those instructions. If not, the following suggestions should be observed.

1. The control should be mounted in the wall, approximately five feet from the floor, as near as possible to the centre of the controlled area.
2. It should be mounted on a partitioning wall, not on an outside wall.

3. It should be mounted as far as possible from undesirable sources of heat and cold such as:
  - a. Windows and doors
  - b. Direct rays from sun
  - c. Hot water or cold water pipes
  - d. Adjoining outside walls



**WHITE-RODGERS DIVISION**  
EMERSON ELECTRIC CO.  
9797 REAVIS RD., ST. LOUIS, MO. 63123  
(314) 577-1300, Fax (314) 577-1517  
9999 HWY. 48, MARKHAM, ONT. L3P 3J3  
(905) 475-4653, FAX (905) 475-4625

Printed in U.S.A.

**PART NO. 37-5427C**  
Replaces 37-5427B  
9520

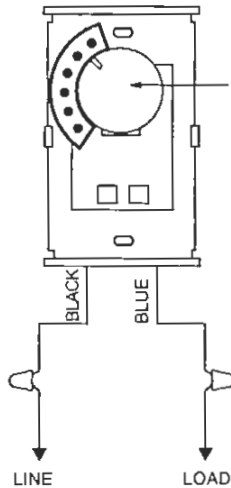
## WIRING

All wiring must conform to local and national electrical codes and ordinances.

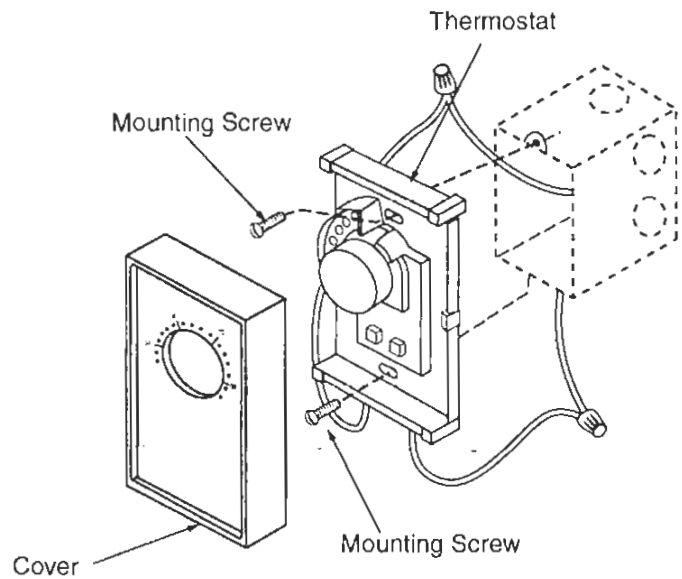
The thermostat may be mounted in any standard 2" x 3" electrical outlet box. For ease of installation use a deep type box.

**⚠ CAUTION**  
**USE WITH COPPER CONDUCTORS ONLY.**

1. Make electrical connection to thermostat leads with wire nuts or other local code approved devices. All connections must be tight.



**Note:** Do not push on this knob because calibration will be changed if knob is bent.



2. Push the lead wires into the outlet box and mount the thermostat to the outlet box with screws provided. **Take care not to push or damage the knob sensing element during installation.**
3. Snap on the thermostat cover and turn knob to desired setting.

# CC SERIES BASEBOARD INSTALLATION INSTRUCTIONS

## LOCATIONS OF HEATERS

Heaters should be located to provide a blanket of heat over the coldest wall of the room, preferably on an outside wall under a window.

**WARNINGS:** High temperatures are present at the outlet air openings. Keep all electrical cords, drapes, and other objects and furnishings clear of these openings by at least one inch or more. Heaters shall not be located below an electrical receptacle, and shall not be installed on paperboard or low density fiberboard surfaces.

Recommendations for drapery placement:

1. Drapes should be clear of the ceiling by at least 1/2 inch.
2. Full length drapes should hang below the center line of the heater but be at least 1/2 inch from the finished floor (such as shag rugs, if used). Drapes should be out-set from the wall enough to have one inch clearance between front of heater and folds of drapes in opened position.
3. Drapery material should not discolor or shrink or stretch upon extended (1000 hour) exposure to temperatures of 200°F.
4. Where short drapes are used, they should be cut off at least six inches above the top of the heater, preferably more.

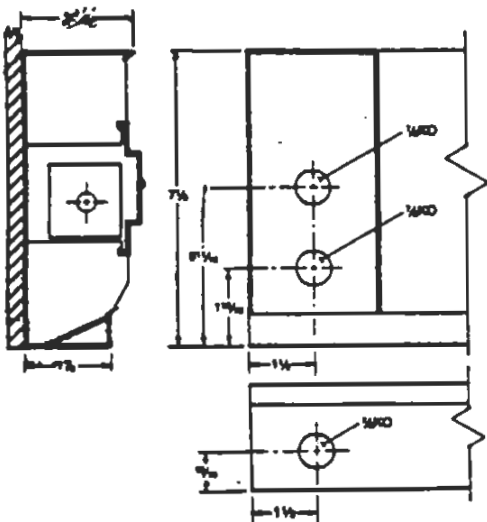
## MOUNTING AND WIRING

These heaters may be wired, for convenience, from either end. Leads are provided in either end connected with a wire nut. Remove wire nut and connect input leads. A corner section is available for right angle mounting of two units and should be allowed for locating wiring. Reference drawings for location of conduit knockouts.

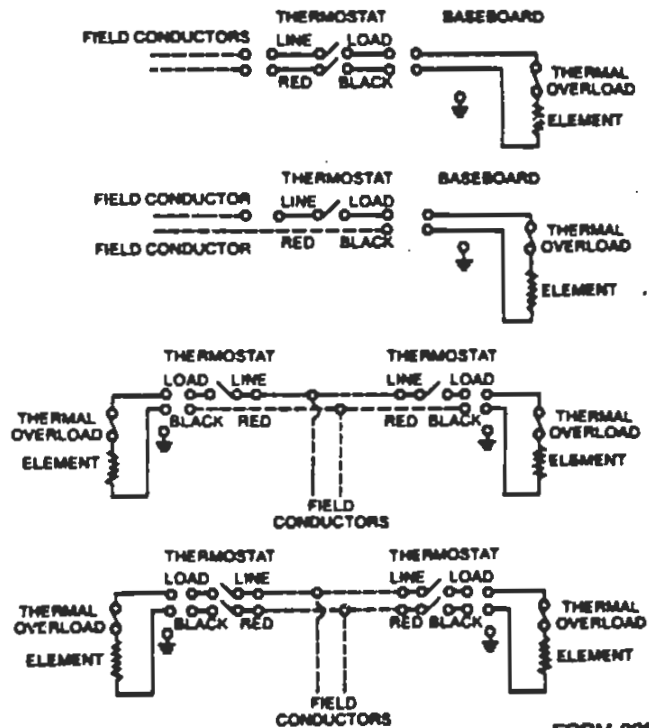
**NOTE:** ALL BASEBOARDS MUST BE GROUNDED IN ACCORDANCE WITH ARTICLE 250 OF THE N.E.C.

FOR INSTALLATION OF ACCESSORIES REFERENCE INSTALLATION INSTRUCTION SHEET PACKED WITH EACH ACCESSORY.

Use narrow suction attachment of the vacuum cleaner and move from end to end above and below fins and cabinet. When cleaning is complete, turn power on.



## WIRING DIAGRAM



Manufactured by TPI Corp.  
P.O. Box 4973, CRS  
Johnson City, TN 37602-4973

**IMPORTANT Do Not Destroy — Save For Homeowner**

FORM 9252  
787  
(UL 1042)

## FOLLOWING STEPS SHOULD BE TAKEN FOR INSTALLATION:

1. Remove junction box cover from supply end.
2. Remove desired knockouts.
3. Secure heater to wall. There is no need to remove front cover. Fasten heater to wall rising area between element and baffle. Make sure unit is not bowed and room is left around fasteners for expansion and contraction of backplate.
4. Remove wire nut (do not cut crimp connection). Make connections in the junction box in accordance with the National Electrical Code and applicable local codes.
5. Connect ground conductor by making loop and placing under the green Hex headed screw provided.
6. Replace junction box cover making sure all screws are in place.
7. Turn on power, adjust thermostat for desired temperature.

## CLEANING SUGGESTIONS

At the beginning of each heating season, we recommend this heater be cleaned to eliminate any accumulation of dust or lint. Before cleaning make sure that the power is off at the main switch. Do not remove front cover during cleaning. Use the narrow suction attachment of the vacuum cleaner and move from end to end above and below fins and cabinet. When cleaning is complete, turn power on.

**CAUTION — DO NOT INSTALL INSULATION ON ANY INSIDE SURFACE OF THIS BASEBOARD HEATER AS THE THERMAL SAFETY DEVICE MAY BE RENDERED INOPERABLE RESULTING IN POSSIBLE FIRE HAZARDS IN THE EVENT OF ABNORMAL OPERATION OR BLOCKAGE.**

**WARNING — TO REDUCE THE RISK OF FIRE, DO NOT STORE OR USE GASOLINE OR OTHER FLAMMABLE VAPORS AND LIQUIDS IN THE VICINITY OF THE HEATER.**

**CAUTION — HIGH TEMPERATURES, KEEP ELECTRICAL CORDS, DRAPES AND OTHER FURNISHINGS AWAY FROM HEATER.**

## LIMITED WARRANTY TO OWNER

P. O. Box 4973 CRS  
Johnson City, TN 37602-4973

Products manufactured by TPI Corporation are warranted to the original consumer to be free from defects in material and workmanship for twelve (12) months from the original date of purchase. The TPI warranty does not cover products modified outside our factory, damage or failure caused by acts of God, abuse, misuse, use on other than rated voltage, abnormal usage, faulty installation, failure to provide suggested maintenance procedures enclosed with the product, improper maintenance or any repairs other than those provided by an authorized TPI Corporation service center.

THERE ARE NO OBLIGATIONS OR LIABILITIES ON THE PART OF TPI CORPORATION FOR CONSEQUENTIAL DAMAGES ARISING OUT OF OR IN CONNECTION WITH THE USE OR PERFORMANCE OF THE PRODUCT OR OTHER INDIRECT DAMAGES WITH RESPECT TO LOSS OF PROPERTY, REVENUES, OR PROFIT, OR COSTS OF REMOVAL, INSTALLATION OR REINSTALLATION.

ALL IMPLIED WARRANTIES WITH RESPECT TO TPI PRODUCTS, INCLUDING IMPLIED WARRANTIES FOR MERCHANTABILITY AND IMPLIED WARRANTIES FOR FITNESS, ARE LIMITED IN DURATION TO TWELVE (12) MONTHS FROM ORIGINAL DATE OF PURCHASE, EXCEPT THOSE PRODUCTS OR PARTS OF PRODUCTS WHICH ARE WARRANTED FOR LONGER PERIODS. ON SUCH PRODUCTS OR PARTS OF PRODUCTS ALL IMPLIED WARRANTIES FOR MERCHANTABILITY AND FITNESS ARE LIMITED TO THE DURATION OF THE EXTENDED WARRANTY PERIOD THEREON.

Some states do not allow the exclusion or limitation of incidental or consequential damages and some states do not allow limitations on how long an implied warranty lasts, so the above exclusions or limitations may not apply to you.

During the warranty period, TPI Corporation will, at its sole option, repair or replace any defective parts or products returned, freight prepaid, to the TPI Corporation factory or such other location as TPI Corporation may designate. Returned products must be packaged carefully and TPI Corporation shall not be responsible for damage in transit. When returning parts, the owner must provide the model number of the product and nature of difficulty being experienced. This warranty does not obligate TPI Corporation to bear the cost of labor in replacing any assembly, unit or component part thereof, nor does the company assume any liability for secondary charges, expenses for installing for removal, freight or damages. There will be charges rendered for product repairs made after our warranty period has expired. Proof of purchase, including date, must accompany request for in-warranty service. In any event, TPI Corporation's maximum liability shall not in any case exceed the list price for the product claimed to be defective. This warranty gives you specific legal rights and you may have other rights which may vary from state to state. For the name of your nearest authorized TPI Corporation service center, please write to TPI Corporation, P. O. Box "T", CRS, Johnson City, Tennessee, 37602.

In addition to the Limited Warranty stated above covering general products, TPI Corporation extends this warranty on the following listed products, which are warranted to the original consumer from the original date of purchase for the total time periods indicated hereinbelow:

- |   |                |
|---|----------------|
| 1. Elements in 198 Series Portable                                | Life of Heater |
| 2. Elements in Baseboards and Portables except L88 and 196 Series | 10 years       |
| 3. Elements in Wall Heaters                                       | 5 years        |

## IN CASE OF PRODUCT FAILURE:

It shall be the obligation of the owner to furnish to the company, within the designated warranty period, the following information:

1. Model Number and date of manufacture of product involved.
2. Complete description of the problem encountered with product.

Upon receipt of the above, the company will reply to the owner within a period not to exceed fifteen (15) working days, the action to be taken by owner.

When requested, it shall be the obligation of the owner to return the defective part to the company within thirty (30) days after its removal, or otherwise follow instructions from the company.

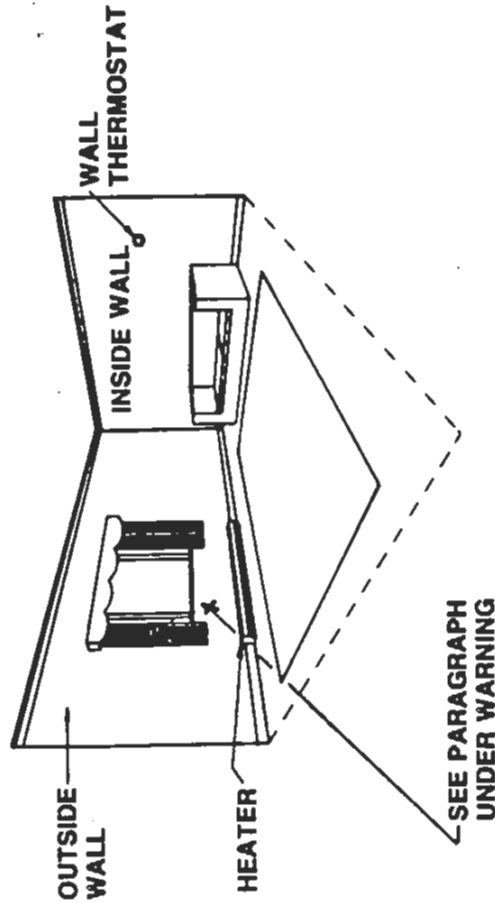


# How to Wire Your Electric Baseboard Heater

Baseboard heaters should be placed on an outside wall under the windows, because this is usually the area of greatest heat loss. The heaters should not be blocked by bulky furniture pieces or by hanging drapes.

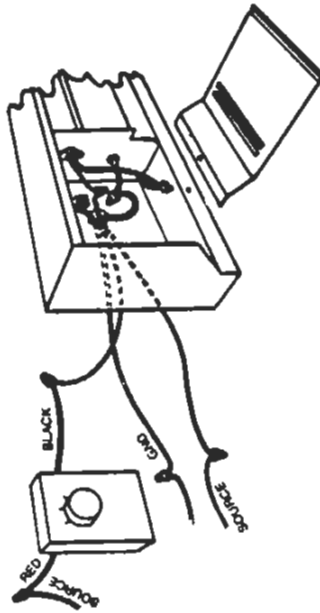
The wall thermostat should be located on an inside wall. Care should be taken to avoid placing the thermostat in direct sunlight, over lamps, or near other heat sources which will cause the thermostat to operate improperly.

**CAUTION — DO NOT INSTALL INSULATION ON ANY INSIDE SURFACE OF THIS BASEBOARD HEATER AS THE THERMAL SAFETY DEVICE MAY BE RENDERED INOPERABLE RESULTING IN POSSIBLE FIRE HAZARDS IN THE EVENT OF ABNORMAL OPERATION OR BLOCKAGE.**



- Follow all local and electrical safety codes as well as the National Electrical Code (NEC) and the Occupational Safety and Health Act (OSHA).
  - Before attempting any electrical connections to the heater, make sure that the circuit breaker controlling the circuit to which the heater is to be connected has been thrown to the OFF position or make sure that the fuse for the circuit has been removed. The circuit breaker panel door or fuse box should be locked or tagged.
  - The heater must be grounded in accordance with applicable codes to the ground screw provided in each end of the housing.
  - Protect power supply cable from kinks, sharp objects, oil, grease, hot surfaces, and chemicals.
- Check baseboard heater voltage on data plate and make sure that it is the same as the voltage being connected to the heater.

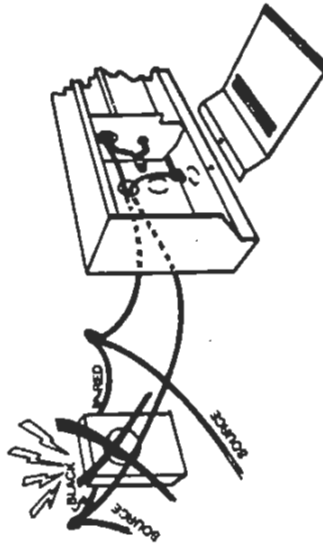
# Wiring the Thermostat Single Pole



**Correct:**

Model 1A22-3—  
Figure 1

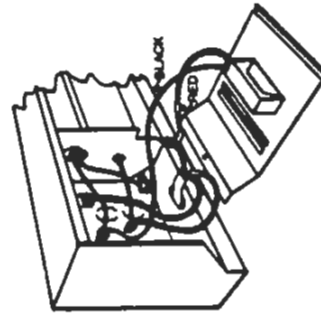
Thermostat is correctly wired in series with the heater and will operate properly.



**Incorrect:**

Figure 2

Notice thermostat is wired directly across the source and causes a short circuit.



**Correct:**

TC-1  
"Built-in" Bi-Metal Thermostat rated 22 Amps 120/240 volts, Single pole breaks one side of line. Adjustable from 40° to 100°-F.

Figure 3

Thermostat is correctly wired in series with the heater and will operate properly.

Thermostats must be connected as shown in Figures 1, 3, 4 and 6. Follow instructions packed with the thermostat or printed on the outside of the thermostat carton. Extreme caution must be taken not to connect the thermostat "across the line" as shown in Figures 2 and 5. Connecting thermostats "across the line" will cause a short circuit and destruction of the thermostat. Also, this wiring error can result in personal injury and/or fire hazard.

## Wiring the Thermostat Double Pole

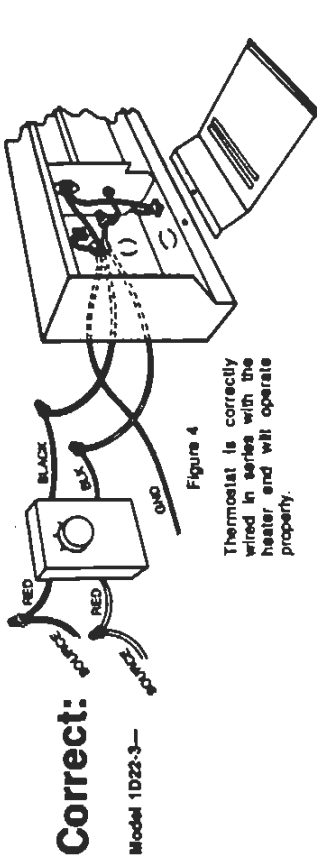


Figure 4

Thermostat is correctly wired in series with the heater and will operate properly.

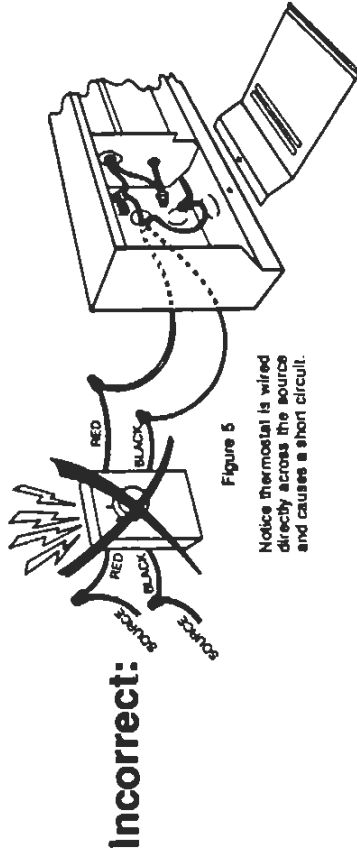


Figure 5

Notice thermostat is wired directly across the source and causes a short circuit.

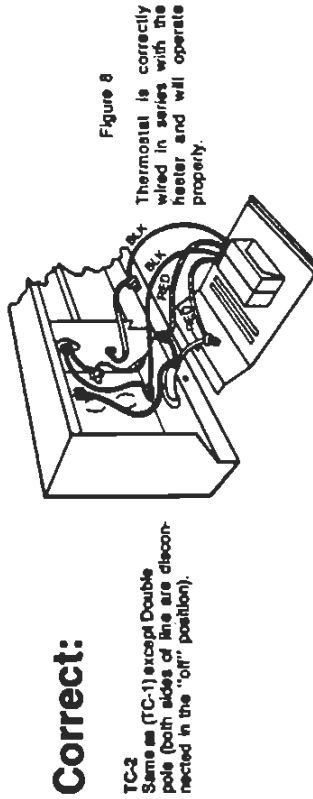
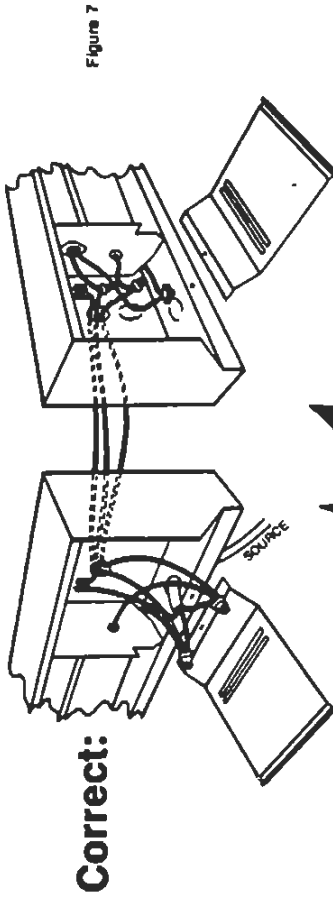


Figure 6

Thermostat is correctly wired in series with the heater and will operate properly.

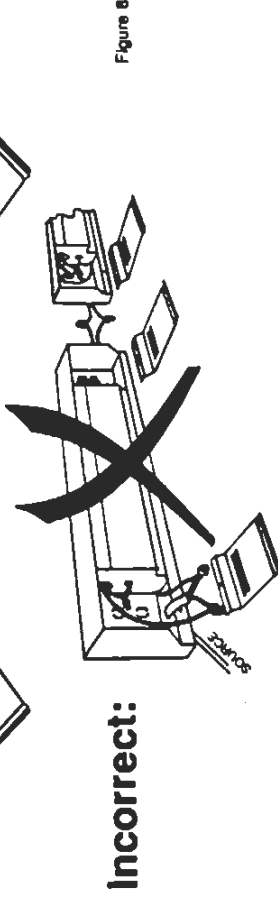
**NOTE**  
For clarity, some electrical connectors, bushings, strain reliefs, and other fittings are not shown in the illustrations.

## Wiring Multiple Units



**Correct:**

Figure 7



**Incorrect:**

Figure 8

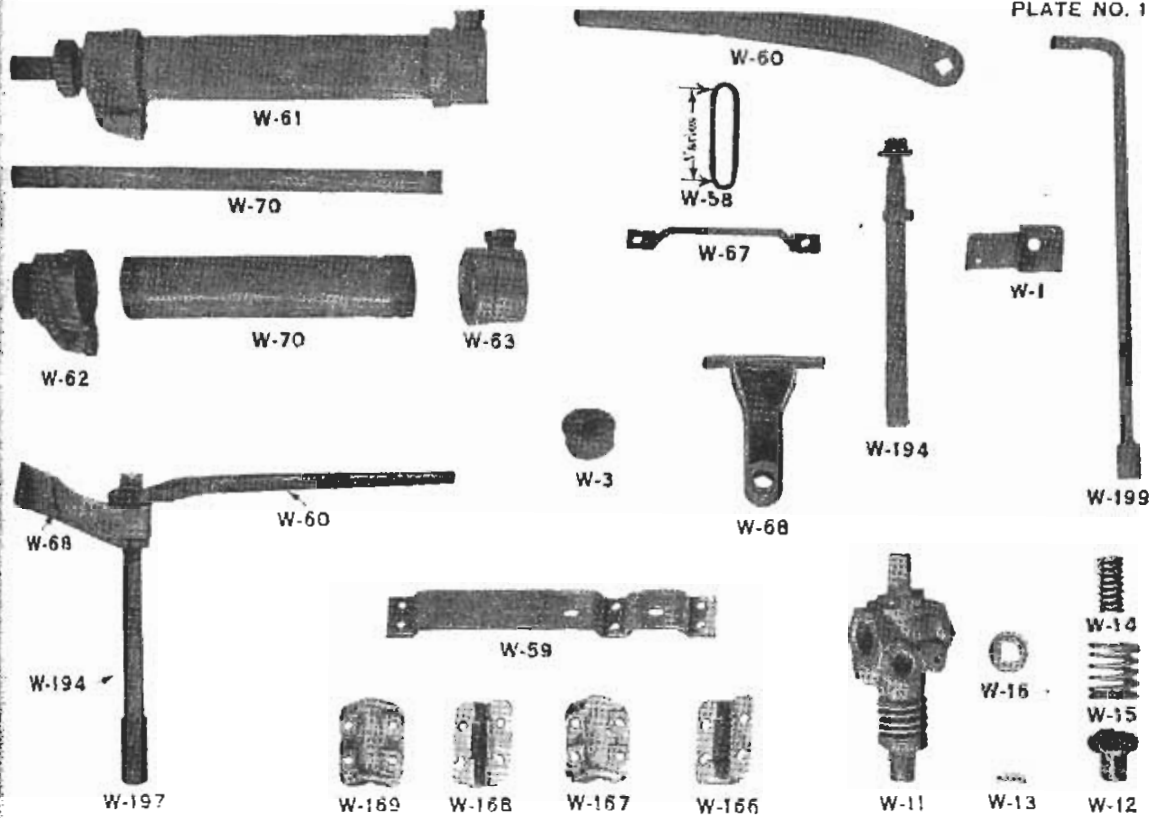
If more than one (1) baseboard heater is being connected, be sure to connect the heaters in parallel. (See Figure 7). If heaters are not connected in parallel, but rather in series as shown in Figure 8, the heat output will be drastically reduced and the heater will not produce enough heat to maintain the proper comfort level in the room.

## Baseboard Heater Troubleshooting Chart

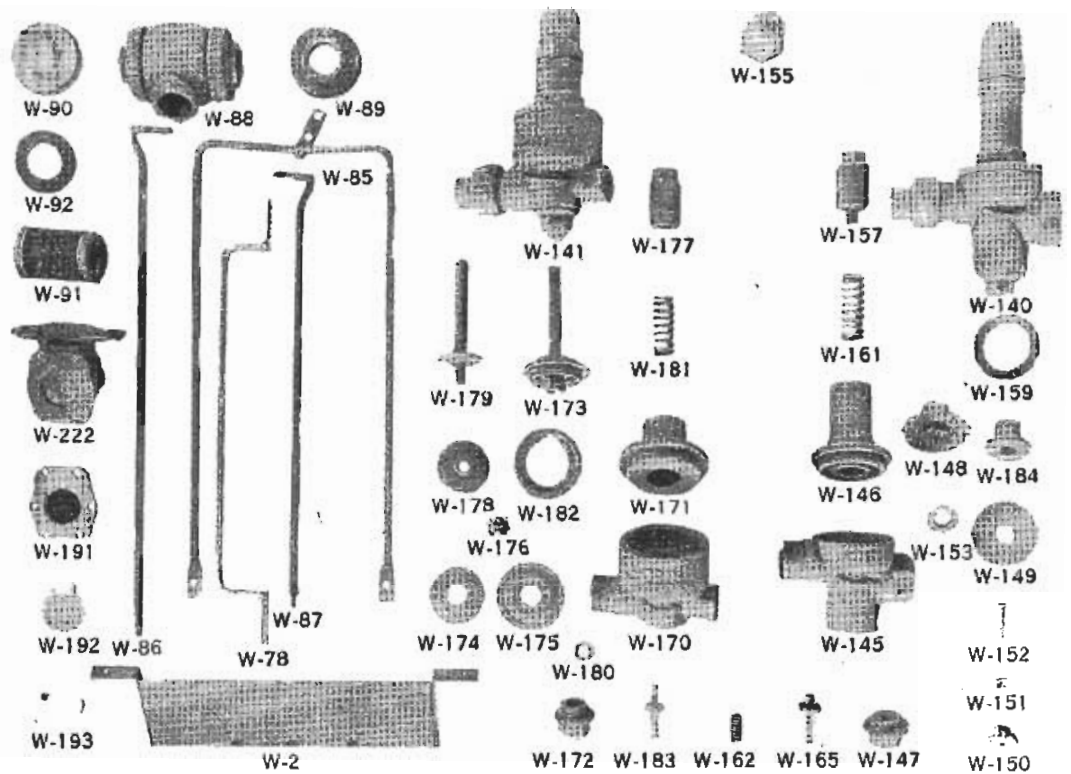
PROBLEM	CAUSE	CORRECTIVE ACTION
Heater does not produce heat.	(a) Thermostat not calling for heat. (b) Circuit breaker not closed, or fuse out. (c) Heaters wired in series. (d) Defective over-temperature cut-off. (e) Over-temperature cut-off damaged by nails or kinks during installation. (f) Defective element.	(a) Turn thermostat clockwise until heater is operating. (b) Close circuit breaker or replace fuse. (c) Correct wiring, wire heaters in parallel. (d) Replace over-temperature cut-off. (e) Repair or replace over-temperature cut-off. (f) Replace element.
Heater burns up immediately when turned on.	(a) Heater connected to wrong voltage.	(a) Replace heater with correct heater for voltage supplied.
Heater does not shut off.	(a) Thermostat setting too high. (b) Thermostat destroyed by wiring "across the line".	(a) Reset thermostat to lower setting. (b) Replace the thermostat.

**Correct:**

TC-3  
Same as (TC-1) except Double pole (both sides of line are disconnected in the "off" position).



WATER SYSTEM - FUNDAMENTAL PARTS



WATER SYSTEM FUNDAMENTAL PARTS



W-100



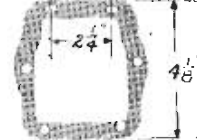
W-231



W-234



W-80



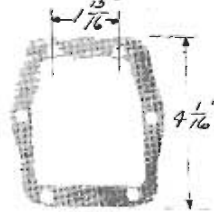
W-224



W-228



W-232



W-635



W-227



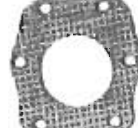
W-117



W-235



W-241



W-226



W-225



W-233



W-115



W-229



W-230



W-222



W-223



5



108

FILLING VALVES, SHUTOFF VALVE, & PARTS



W-138



W-203



W-211



W-218



W-217



W-212



W-8



W-219



W-213



W-214



W-206



W-210



W-6



W-215



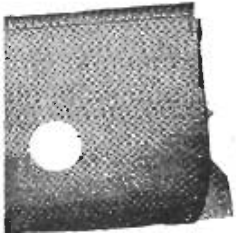
W-207



W-216



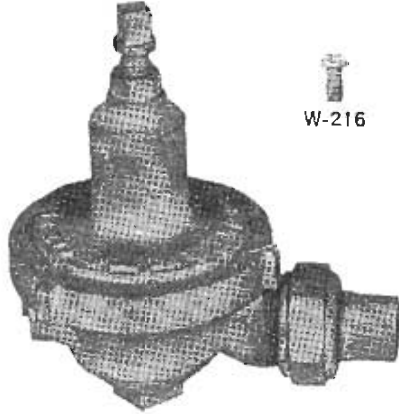
W-220



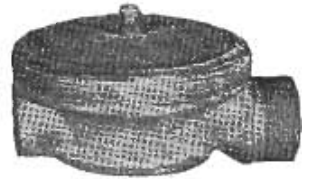
W-5



W-202



W-200



W-201

REDUCING VALVE AND PARTS