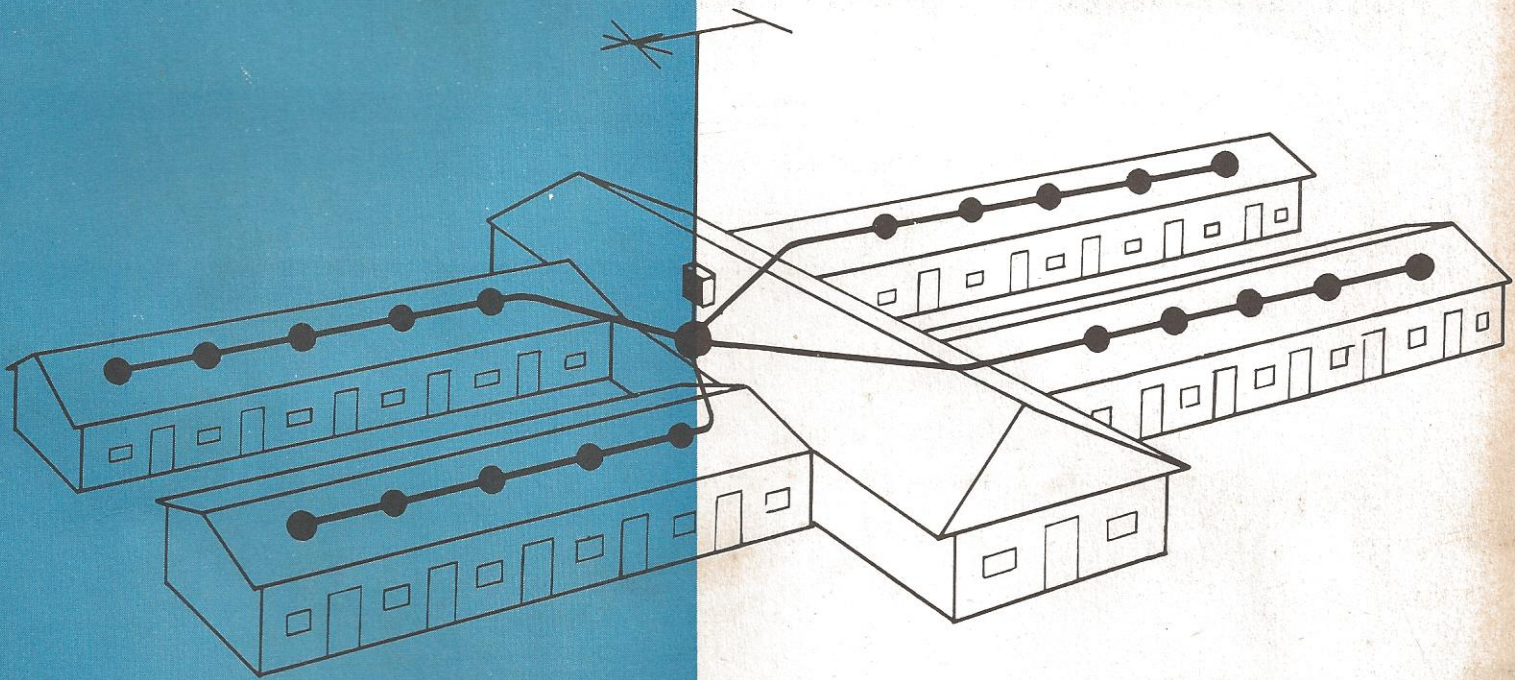


PRICE TWENTY-FIVE CENTS

# INSTALLATION MADE EASY

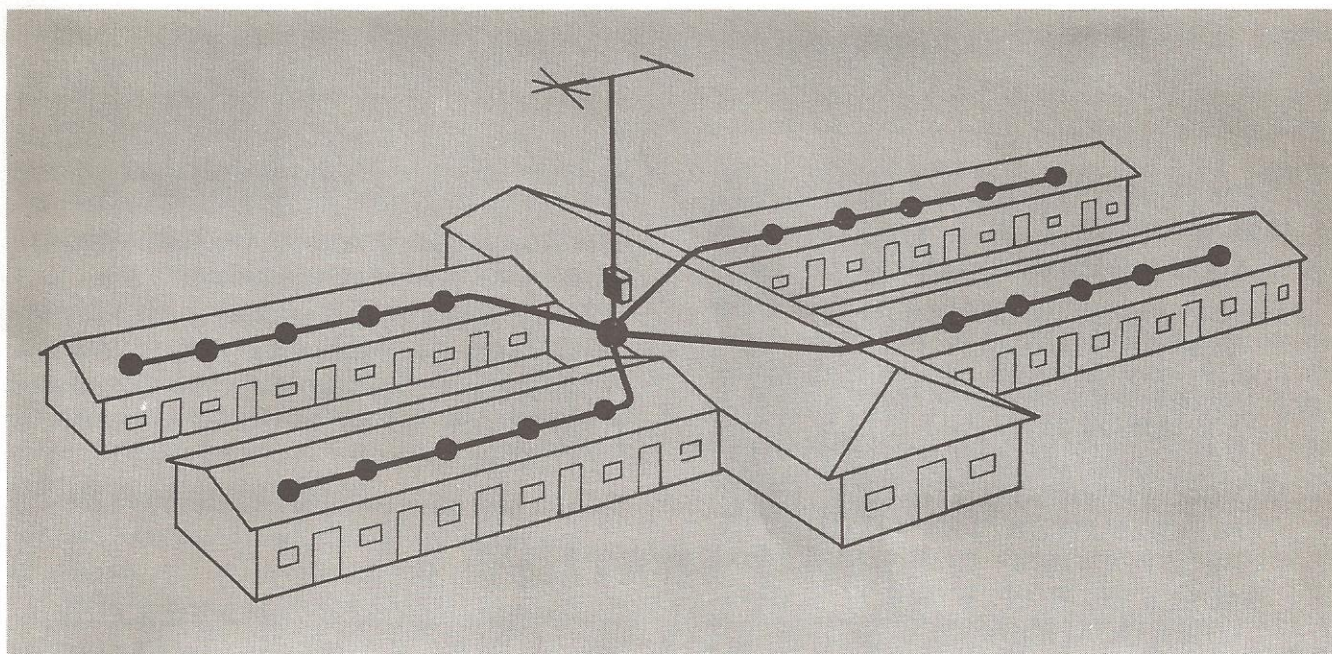


***Jerrold TV Multi-Outlet Systems***

# JERROLD

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## Selling Multi Outlet Systems

Owners of buildings have a habit of asking "how much" even before you find out what they really want in their master antenna system installation. Too many hours have been wasted by salesmen on estimates before they have really SOLD the job. A proper estimate is a time consuming operation that should be undertaken only AFTER the owner of the building has really decided that he NEEDS an antenna system.

The salesman should first determine WHY the building owner requested an estimate in the first place or granted your appointment. Your interview should revolve around this one point. It may be that he has had roof damage. It may be that tenants want better pictures. It may be that he wants to protect or improve the appearance of his building. Whatever the reason, the salesman should ask questions until he determines the WHY. Avoid quoting price until you know WHY the owner expresses an interest. Once you know, start building up the advantages of the master antenna system as it meets the demands of the owner. Once you have convinced him that your installation will solve his problem, then you can proceed to find out exactly how he will permit you to install the system. Zero in on details during the FIRST visit. The longer you delay getting down to figures, the less chance you have to sell the system.

An excellent answer to the "how much" question is to state flatly that the price of your installation is determined by one factor . . . how he will permit you to wire the building. Ask him if he intends SELLING the service or GIVING it away. This one point will bring a question from him . . . "WHY?" Your answer is that if he intends selling the service he may want to use double shielded cable to eliminate the remotest possibility of free signal through radiation. Of course this is more expensive and will increase the overall cost of the job, but it will pay for itself in more connections. On the other hand, if everyone in the building is going to get a connection at no charge, single shielded cable will be adequate. Actually, at the low levels used in the Multi-Outlet System, there should be a minimum of radiation through the single shielded coaxial cable, but double shielded cable acts as an insurance policy.

Next, show the owner an LT300 or an LT75 line tap unit. Point out that this is all that will appear in the apartment. Ask him where he wants these mounted.

Try to get away before you give the price and then do some figuring before you submit the final proposal. However, sometimes this is difficult, so the following procedure may be of value for on-the-spot proposals:

# ON-THE-SPOT PROPOSALS

1. Know the average roof costs for your area.  
This includes:

- a. cost of antenna and installation
- b. cost of amplifier and splitter and UHF converters if needed
- c. average cost of supplying power (THIS IS AN IMPORTANT VARIABLE SINCE YOU MAY HAVE DIFFICULTY GETTING POWER TO THE CENTER OF DISTRIBUTION. TRY TO GET THE PROSPECTIVE CUSTOMER TO AGREE TO SUPPLY 110V TO AMPLIFIER LOCATION)
- d. add your profit and labor.

The above figure will remain fairly constant throughout a given area and should be calculated before you go near a customer. Let us assume that adding every item above comes to \$150.00 in your section of the country. This means that you have an "overhead" for the system. Even if only one set is connected to the system, you have a \$150.00 fixed sale (at list). Use list figures in your conversation since most building owners are excellent businessmen and can certainly pick up any of your cost figures and use them to their advantage. Knowing how much you would charge for all parts of your work gives you confidence in your own estimate. This confidence "radiates" to the owner—probably clinching the sale.

2. Next add all of your room costs—LT300, plus average cable in a room. Add your labor . . . Let us assume that you have a \$9.00 list selling price per outlet including list labor.
3. Then determine the number of rooms in the proposed installation—let us say, 20—This means that your roof cost of \$150 is divided by 20 (the number of rooms) and comes to \$7.50 per room.
4. You now have two known quantities, the cost per room for the roof work and the cost for equipment and labor to get to the window. In this case we have \$16.50 as a selling price.

In many cases this will cover the job with the exception of possibly \$50.00 for additional cable, fittings, and labor. Now let's get the grand total. \$16.50 times 20 comes to \$330.00 plus the \$50.00 OR WHATEVER ADDITIONAL WORK AND MATERIAL IS DICTATED BY THE BUILDING OWNER and the mechanical layout of the building. This is the one set of unknowns that will vary from job to job.

The main point that should be gathered from the above calculations is that the entire sale price really revolves around how fussy the building owner becomes. If you can point out just exactly how much each of his requests adds to the cost, you will find that he starts getting reasonable and at the same time is convinced that you know what you are about. You'll probably get the order!

**PROPOSAL CHECK LIST (Figure at sale price)**

ROOF COSTS			DISTRIBUTION COSTS			CALCULATIONS		
1. Antenna Installed			1. Equipment Cost per room			1. Add roof costs		
2. Amplifiers and Splitters Installed			2. Cable cost per room (include run to next room)			2. Add costs per room for distribution and multiply by the number of rooms		
3. Cost of Supplying AC and cabinets if owner must lock equipment			3. Labor cost per room			3. Add cost for maintenance for first year		
4. Misc. roof costs—cable, hardware, including labor						4. Add insurance costs		
						<b>Total</b>		

## TECHNICAL DESCRIPTION OF EQUIPMENT

# AMPLIFIER



The ABD-1 is a broadband amplifier designed to take signals from the 100 microvolt region and increase them to levels capable of being distributed to 20 receivers—snow free.

IMPEDANCE	IN: 72 ohms or 300 ohms OUT: 72 ohms
MINIMUM GAIN SPECIFICATIONS	25 db
RATED OUTPUT (MAXIMUM)	0.1v per channel for 7 channels
RATED INPUT (MAXIMUM)	5500 uv per channel for 7 channels
NOISE FIGURE	6 db low band 7.5 db high band
TUBE COMPLEMENT	3-6BQ7A, 1-6CB6, 1-6AK5
CABLE FITTINGS	72 ohms: C-61 300 ohms: screw terminals
FUSE PROTECTION	B + 1/10a Slo Blo Pri. 1/2a Slo Blo
DIMENSIONS	11" x 4" x 5"
SHIPPING WEIGHT	7 lbs. 7 oz.
POWER REQUIREMENTS	35 watts, 117v AC, 50-60 cps

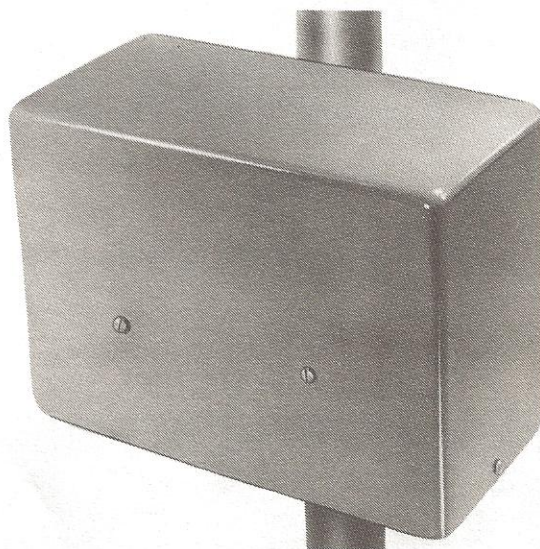
## MIXING NETWORKS

The Desnower Mixing Networks greatly increase the flexibility and versatility of the Distribution System. By permitting the use of individual, cut to channel antennas, they enable the installation of Desnower Systems in many locations where problems previously required application of separate channel amplifiers. The input level of each channel may be controlled independently by the use of PD pads in antenna down leads. A constant ratio of output levels for all channels can thus be maintained, and uniformity of reception achieved, even in areas where the signal levels of different stations vary greatly.

The DMN units can be mounted on the mast to reduce the number of down leads necessary or they can be mounted near the equipment when the amplifier location is close to the mast.

*The DMN-LO unit.* For channels 2-6. A low loss antenna mixing network permits as many as four individual cut to channel antennas to feed into a single input. Each input and output is tuned to 72 ohms.

## DMN-LO • DMN-HI



*The DMN-HI units.* For channels 7-13. A low loss antenna mixing network permits as many as four individual cut to channel antennas to feed into a single input. Each input and output is tuned to 72 ohms.

## TECHNICAL DESCRIPTION OF EQUIPMENT

# Signal Splitting Networks

Two models of signal splitting networks are available; the

T1604—four output splitter

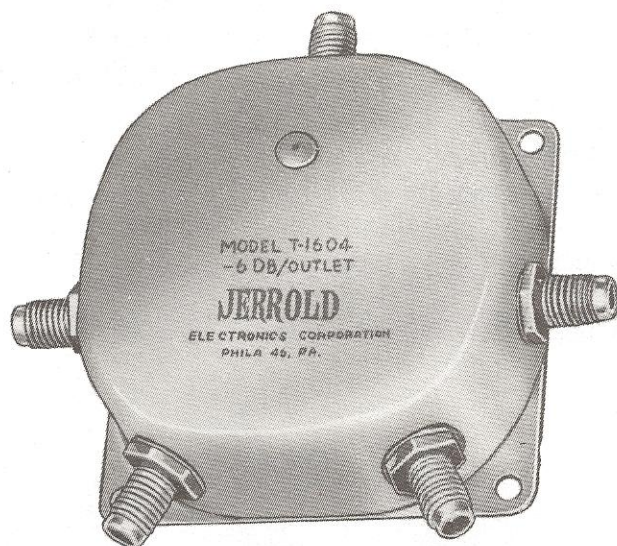
1602—two output splitter

These units have similar electrical characteristics, but employ different methods for achieving signal splits.

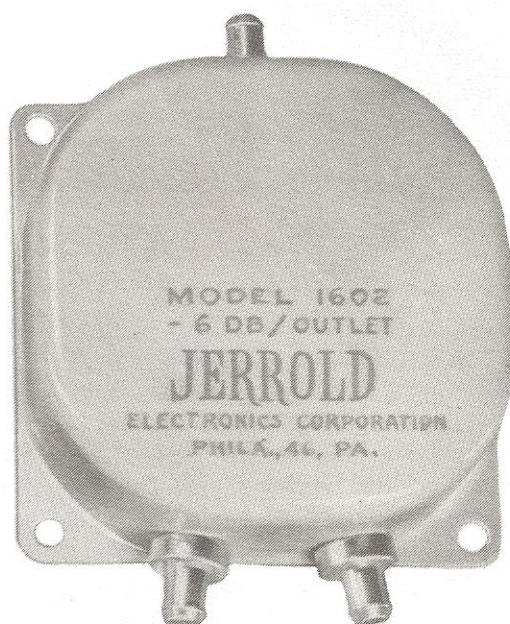
T1604—This is a reactive split with a loss of only 6 db while the isolation between lines is 12 db.

1602—This is a resistive split with a loss of only 6 db while the isolation between lines is 6 db.

Tuned reactive splitters of the T1604 type require careful match on all lines while the resistive 1602 type is less critical, but to achieve the minimum of loss while splitting more than two ways, a reactive splitter is desirable.



MODEL T1604—FOUR OUTPUT SPLITTER



MODEL 1602—TWO OUTPUT SPLITTER

**NOTE:** All terminals not being used on the T1604 must be terminated in TR72 terminating resistors. Utilizing all JERROLD components assures the match necessary when taking advantage of this low loss splitter.

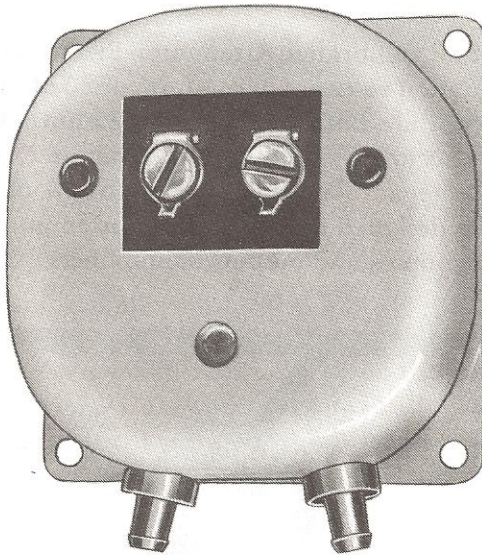
# LINE TAPS

Two basic line tap units are available, the LT300 and the LT75. Both are designed for use as line tap off units, for use with coaxial cable type RG 59/U. Both units use Jerrold's new coaxial feed through bushing Model B-59. The LT75 is used to provide a tap off for 72 ohm receivers and has a coaxial fitting provided for this purpose. The LT300 is designed to provide a tap off for 300 ohm receivers

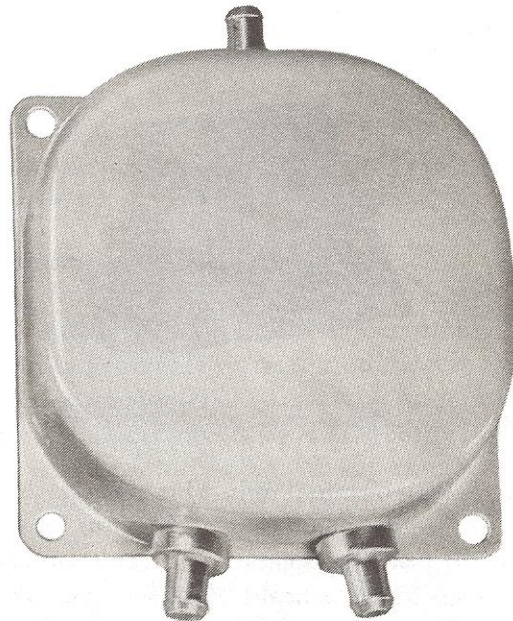
and is fitted with 300 ohm screw terminals. Both units are built into a radiation-proof steel housing and are designed for wall or baseboard mounting.

Also available are the LT300 T and the LT75 T, both of which are similar to the aforementioned units, except that they have built-in termination for use at the end of a feeder line.

Shown below are attenuation charts for each unit.



MODEL LT300—300 OHM TAP-OFF

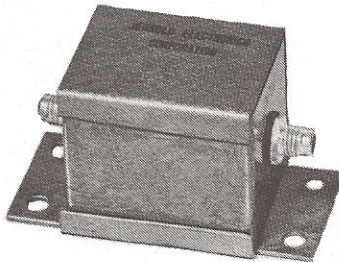
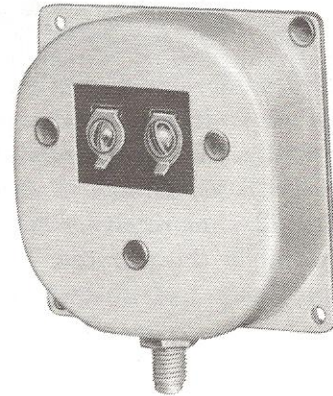


MODEL LT75—72 OHM TAP-OFF

LT 300			LT 75	
	Thru	Tap off	Thru	Tap off
50 mc	.25	14.5	.3	18.2
90 mc	.35	11.5	.33	16.4
170 mc	.2	11.0	.2	14.6
220 mc	.2	10.5	.25	14.2
Losses listed in db				

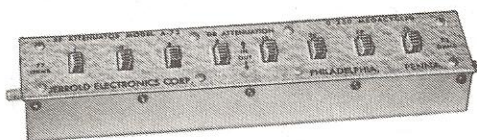
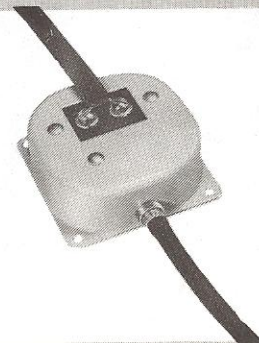
# ACCESSORIES

**MODEL T372** . . . Impedance Matching Transformer for matching 72 ohm to 300 ohm devices. This unit will match a 300 ohm receiver to 72 ohm coax line. In going from 72 to 300 ohms it furnishes a 5 to 6 db voltage step up. The frequency response is flat from 50 to 250 megacycles. It will isolate AC/DC or transformerless receivers from the system and has a VSWR of 1.48. It is built into a steel radiation-proof case finished in ivory baked enamel. Screws are included for flush mounting.



**P-D PADS** . . . Calibrated Attenuator Pads available in attenuation values of 3, 6, 10, 20, or 30 db. Input and output are both matched to 72 ohms. These units are accurate to within plus or minus 2% from 0 to 250 megacycles, and have a VSWR of 1.05. They are designed for use as fixed attenuators for balancing inputs and outputs of amplifiers.

**ST1601** . . . Wall terminal unit. This unit matches the television receiver, 300 ohms or 72 ohms, to the 72 ohm line. It provides isolation between transformerless receivers and the braid of the coaxial cable. It also provides termination for the line to the receiver, but does not provide the voltage step up of the T-372.



**A72** . . . Precision-built variable RF attenuator. The A72 provides precise attenuation from 0 to 82 db, by simple in and out switches. Designed for use with 72 ohm coaxial cable, the attenuator is linear over a range of frequencies from 0 to 250 megacycles. It has a VSWR less than 1.05 when properly terminated. Accuracy is plus or minus 1 db at the maximum (82 db) attenuation. The insertion loss is less than .5 db at 200 megacycles. It is capable of handling 500 milliwatts CW.



**FREQUENCY RANGE:** 54 to 220 mc covered in one band

**ACCURACY:** 0.8 db over entire range

**SENSITIVITY:** 5 microvolts

**POWER REQUIREMENT:** AC: 55 watts, 105-125 v.

DC: 30 watts (5 amp.)

5.5-6.5 volts (with 704A-6V power supply)

**PHYSICAL SPECIFICATIONS:** Height—12"

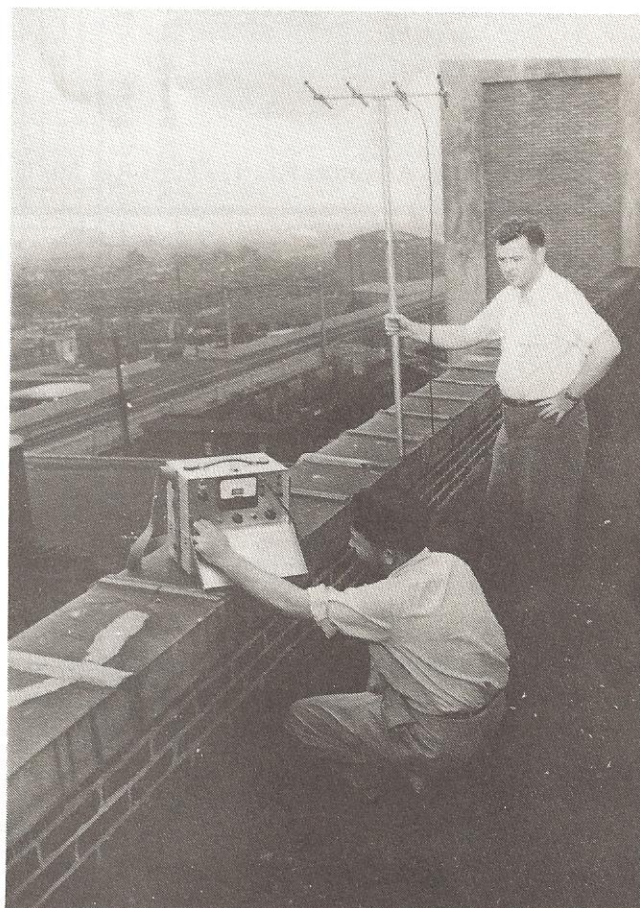
Width—12¾"

Depth—18"

Shipping weight 24 lbs.

Finish—gray crackle finish on sturdy aluminum case

**MODEL 704A ... VHF Field Strength Meter.** The Jerrold Model 704A Field Strength Meter is a portable instrument designed and built to precision standards normally found only in laboratory equipment at 3 or 4 times its price. Its accuracy and dependability make it the ideal instrument for balancing master antenna systems, checking cable losses, locating and orienting antennas, etc. The 704A can be powered from a 117vAC line or from a 6 volt storage battery by using the 704A-6V power supply.



## ANTENNAS

In areas where all channels are ghost-free, and approximately equal in signal strength, an all-band antenna may be used effectively. This antenna may be either 72 ohms or 300 ohms. In an area where the low band stations are in one general direction and the high band stations in another, separate

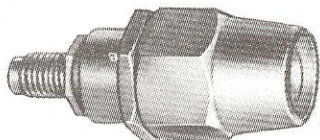
high and low antennas may be used, also either 300 or 72 ohms. In the case of particularly difficult reception areas, where the signals are either weak or extremely hard to receive without ghosts, separate cut to channel yagi antennas may be used for each channel received.

# Solderless Co-Axial Connectors

**FITTINGS . . .** The following fittings are available for use with Desnower Equipment:



C-51 Male fitting for RG 59/U



C-101 Cable Adaptor, RG 11/U to RG 59/U

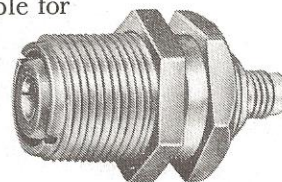
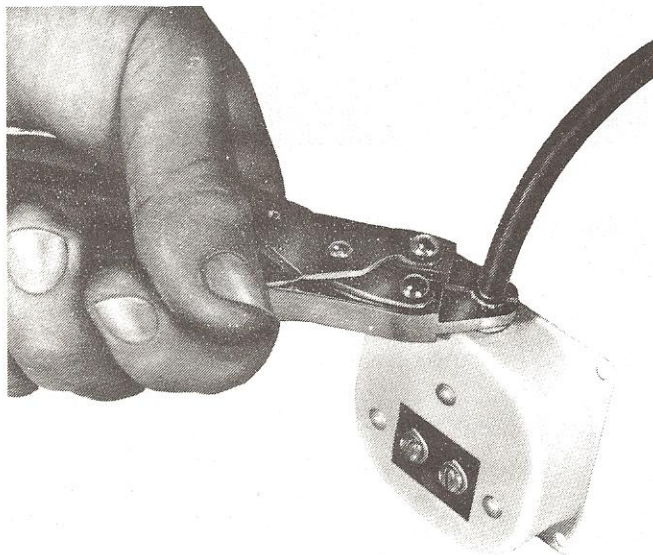


C-61 Female chassis connectors



C-81 Feed through connector for RG 59/U

PL-601 Crimping Tool for B-59



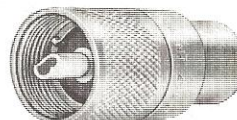
C-5911 Cable adaptor, RG 11/U to RG 59/U



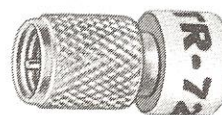
C-52 Male fitting for RG 59/U



C-56 Male fitting for RG 6/U

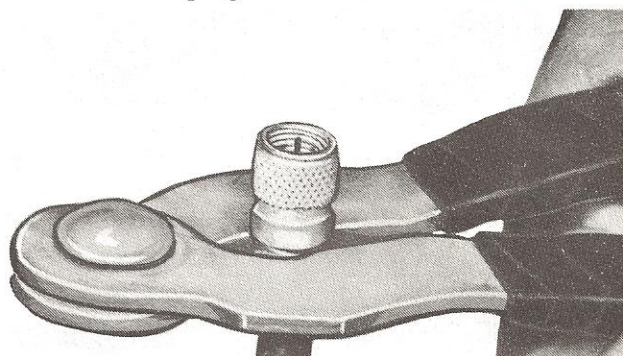


C-1113 Male connector for RG 11/U



TR-72 Terminating resistor

PL-52 Crimping Tool for C-52 and C-56



# SYSTEM LAYOUT

## FLEXIBILITY

An important feature of the Jerrold Multi-Outlet System is its extreme adaptability to varied types of installations. This flexibility is obtained through the use of antenna-mounted pre-amplifiers, the model ABD-1 Distribution Amplifier, and the available Splitter Networks. Correct use of these units will provide maximum cable economy for any given installation. The Jerrold Multi-Outlet System may be used in motels, clubs, large homes, small garden-type apartments, and dealers' stores, where cable runs do not exceed specified lengths. Before planning a Jerrold Multi-Outlet System layout, a study should be made of the building plans or sketches, and a survey made of existing signal strengths. The system layout will depend greatly on the signal levels received at the antennas. The Jerrold Field Strength Meter, Model 704A is a very accurate meter for this purpose.

## DOLLARS AND DB

All amplifier ratings, cable losses, etc. are specified in db (decibels). However, for the successful television system installation man, the sooner he can reduce db to "Dollar Bills" the longer he'll be in business.

Since the Jerrold TV Multi-Outlet System was designed for specific jobs, the simplified layouts in this manual will be adaptable to the vast majority of installations. However, there are enough deviations from the anticipated that it will be wise to learn as much as we can about how far we can stretch the "ideal" system.

Which brings us back to db—Any good book on electronics will develop the theory of the decibel

completely. Our little recipes may stretch the letter of the word here and there, but for the purposes of this manual the following descriptions will allow us to zero in on the most important items—how far can we go on a line?—and what do we do when we want to go further?

## WHAT AMPLIFIER RATINGS MEAN?

The ABD-1 amplifier is rated at a gain of 25 db on all channels. This means that providing we have acceptable pictures on one receiver connected to its own antenna, we can amplify this signal, distribute it through 25 db of system loss, and still end up with pictures equal to or better than when we started. At this point forget about how many times in voltage or power we increased the signal. The thing to consider is that we now can absorb 25 db of signal and STILL have pictures.

## TO OVERCOME THE LOSS INSERTED BY THE CABLE

*The only reason for an amplifier in a distribution system is to OVERCOME the loss inserted by the cable and the tap off units.*

All of the calculations necessary to figure our distribution system immediately resolve into a simple matter of adding up loss that we install and keeping the grand total of all loss under the 25 db gain of our amplifier. It's as simple as that.

# TAP OFF THEORY

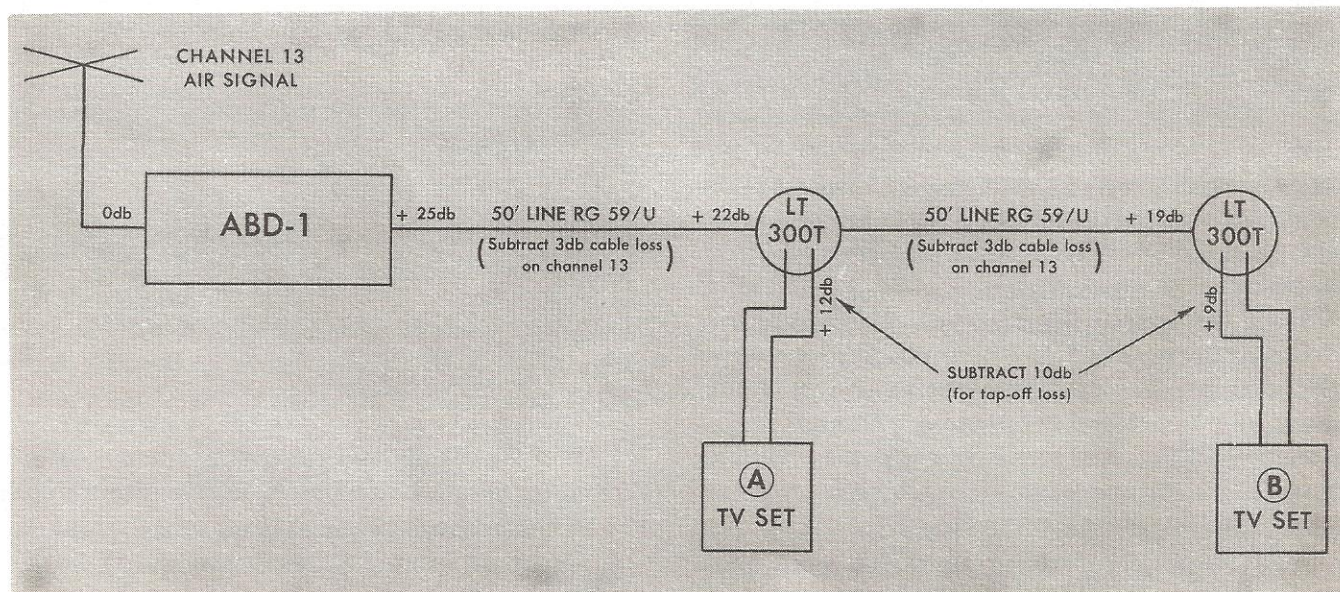
There are two major considerations in designing tap off units . . . The first is that the unit must isolate the set from the line. The design of present day television receivers is such that the local oscillator will probably transmit more RF than it receives in the fringe area. This transmitted RF (local oscillator radiation) must be kept out of the line or it will interfere with reception on other receivers connected to the line. The basic theory of the Jerrold Multi-Outlet System is simple—insert a calculated loss between the set and the line. This loss must vary with channel frequency to compensate for unequal frequency vs. attenuation variations in cable and should be large enough to reduce oscillator radiation to a point where set interaction is negligible. Actually, local oscillator signals through the line must pass through two isolation units . . . the one at the offending set and the one at the set you are checking. This means that the tap off losses (as they are called) are added—giving additional protection. The tap off loss of the LT units is in the order of 10 to 15 db.

The air signal is increased 25 db by the amplifier. The output of the amplifier is then shown as plus 25 db over the air signal. As we moved along the cable 3 db was subtracted for cable loss (6 db per 100 feet on channel 13 used in the example). This

means that the signal entering the first Line Tap unit is 22 db above air signal. Actual microvolts are unimportant so long as it is stronger than the air signal. The tap off loss to the set is approximately 10 db (see equipment description). This means that the set connected to the terminals will receive signals 12 db stronger than air signals. However, any oscillator radiation trying to feed back into the line sees the same 10 db of tap off loss and is reduced by that amount before it can get into the line. Going on to the next receiver the air signal of 22 db is reduced by the 3 db of cable loss and then reduced again by the 10 db tap off loss. It reaches the set at a level of 9 db above air signal—We can keep this up until we arrive at zero db before we court trouble.

Let's go back to the oscillator radiation of the first set. It was reduced by 10 db getting into the line. It is further reduced 3 db by the cable AND IT IS AGAIN REDUCED ANOTHER 10 db by the tap off loss of the other receiver. This means that we have reduced the interfering signal by 23 db before it gets to the other receiver and at the same time we have delivered a signal 9 db over air signal to the same receiver.

The second consideration in designing a tap off unit is in minimizing feed through loss. This loss is the "suck out" of signal caused by the insertion of a tap off unit in the line. The Jerrold LT units cause a maximum loss of only 0.3 db for each insertion. This represents only 3 to 4 feet of RG 59/U cable at channel 13 frequencies.



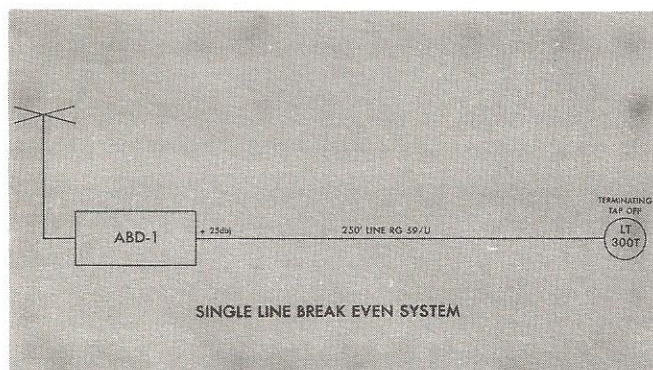
# The "Break Even" System

First we shall describe what we call the "break even" system. This system settles for what we receive on the antenna array and can deliver this signal (or a little stronger) to the last outlet on the line. All of our calculations will be based on channel 13 cable losses, and channel 13 tap off and feed through losses. This means that all other channels will get through with no trouble. If channel 6 is the highest to be distributed then all cable lengths may be doubled.

## DB RATINGS TO CONSIDER FOR A CHANNEL 13 SYSTEM

- 1) Amplifier Gain 25 db
- 2) LT 300 Tap off loss 10.5 db
- 3) RG 59/U cable loss 6 db per 100 ft.
- 4) Splitter loss 6 db (equiv. to 100 ft. of RG 59/U cable)
- 5) LT 300 insertion loss 0.3 db (subtract 5 ft. of cable for each tap inserted)

Starting with the simplest system:

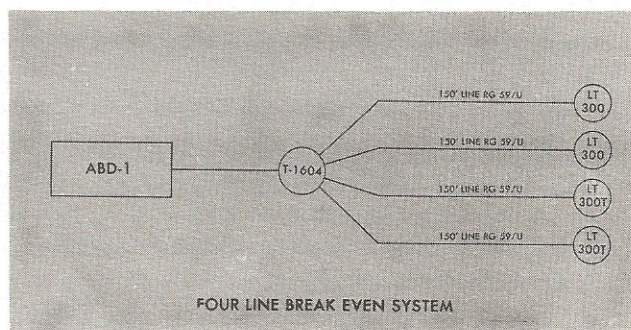


On a break-even system, consisting of one line with one LT 300 T (terminating tap off unit) at the end, air signals to the receiver will be equaled at a distance of 250 ft. from the ABD-1. Calculations: Tap off loss—10.5 db plus a 250 ft. cable loss of 15 db approximates amplifier gain of 25 db . . . and we break even with air signal.

For each additional tap we add we must subtract 5 ft. of cable . . . This means we can feed 10 receivers on one line 200 ft. long—or 20 receivers on one line 150 ft. long!

Next, suppose we wish to use up to four lines for distribution. We therefore insert a 1602 (two way split) or T 1604 (4 way split) and continue our calculations. Since the two splitters insert exactly the same loss in all feed lines, calculations are identical whether two or four lines are used. It may be well to note at this point that the 1602 is a resistive splitter inserting 6 db of loss while to achieve the same loss for 4 line splitting a reactive unit is used . . . Reactive splitters have the advantage of lower loss for more lines, but have the disadvantage of being more susceptible to line mismatch than the resistive splitter. When using the T 1604 it is strongly recommended that only Jerrold components be used throughout the system and that care be taken to terminate all lines with LT 300 T, LT 75 T or TR 72 units. Any mismatch can reflect back through the splitter into the other lines of the system, but if reasonable care is taken the low loss characteristic of the T 1604 makes it the most desirable line splitter on the market.

Getting back to splitting our single line system: Since 6 db represents 100 ft. of RG 59/U, an ABD-1 amplifier feeding a splitter can deliver signal to 4 lines 150 ft. long with LT 300 T units at the end. This simply shortens all figures calculated for the single line system by 100 feet. **SO THE RULE BECOMES—ADD A SPLITTER, SHORTEN THE RUN 100 FEET; ADD A TAP, SHORTEN THE RUN 5 FEET.**



Our break even system allows us 5 receivers in each of 4 lines (kept under 100 feet in length to be on the safe side) or a maximum of 20 receivers on one amplifier. We will then have signals equal to, or stronger than, antenna signals.

## CASCADING AMPLIFIERS

### (Or the Maximum System)

Before we attempt to cascade amplifiers or work with the "maximum system" several basic rules must be memorized. We say this in all seriousness since it is here that many a good man has decided to end it all and go back to the service bench muttering to himself.

1. *NEVER ADD AN AMPLIFIER ON A LINE AFTER YOU HAVE MADE A SET TAP. Oscillator radiation can be reduced through the tap off loss of the unit, but if it's picked up and amplified then you may have serious trouble in receivers following the reamplifier.*
2. *Avoid cascading more than two amplifiers. The tilt in the cable response will make more than two broadband amplifiers in a row undesirable.*
3. *Never overload an amplifier with too much signal input. Cross modulation and sync clipping will result. KNOW YOUR OVERLOAD POINT!! Color television is here. Don't break any of these rules!*

Considering the larger systems, let us now examine the maximum or "40 dbj system". In using this layout, we aim for 1000 microvolts at the last receiver and utilize the full output capabilities of the ABD-1.

However, before we get into the larger systems, let us examine our use of the decibel a little more closely. Since any use of db makes sense only when we have a reference (or zero db point), we shall settle for the 1000 microvolts discussed before as our reference. Using 1000 microvolts as zero db, we simplify our future calculations considerably. This means that when we reach zero db we have arrived at the minimum signal that we can deliver to a set (and still be within our self-imposed specifications). Of course modern receivers will give pictures at much lower levels than 1000 microvolts WHEN THEY ARE IN TOP WORKING ORDER. There is no doubt that you can reduce the 1000 microvolts as a minimum two to three times and still have a better picture than most people receive in the fringe, but for the sake of future maintenance—try to design around 1000 microvolts.

**A POINT OF CAUTION:** *These levels only apply to average area and fringe area reception. You probably will have to use much higher levels than 1000 microvolts in primary areas where direct pick-up is a problem.*

Since 1000 microvolts will be used as our "zero db" reference we can label this "zero dbj" and levels above and below this figure will be labeled plus or minus dbj.

Now turn to the graph on page (16). This db graph will give you the signal level in microvolts for dbj values that you will be using in your layout of the maximum system. Assume, for the sake of illustration, that you measure a signal of 10,000 microvolts. This means that we have 20 dbj (referred to a 1000 microvolt zero level).

Now take any signal that you are likely to measure at the antenna—300 microvolts, for example. Looking at the chart we find 300 microvolts to be approximately -10dbj. Now assume that we feed this signal into a DeSnower preamplifier and run the signal up by the rated 25 db. This gives us plus 15dbj or 5500 microvolts. From now on all examples work the same. . . . If you insert an amplifier you move up on the graph by the gain of the amplifier. If you insert cable you move down on the graph by the cable attenuation at the channel frequency under consideration. For purposes of this manual we use channel 13 as our working frequency and assume a cable attenuation of 6db per 100 ft. Therefore the insertion of 300 ft. of RG 59/U cable will move us down on the graph 18db.

The easiest way to stay out of trouble in your system layout is to keep the ABD-1 input within the dotted rectangle. If you move off to the left below 300 microvolts (-10dbj), you are getting into the snow at the ends of the system. If you move off to the right beyond 5500uv (15dbj), you will get into trouble with cross-modulation in the output of the amplifier.

Getting back to our layout of the "maximum system": The maximum undistorted output of the ABD-1 is 0.1 volts (40dbj). The gain, however, is 25 db, so that to get the full rated output, we must feed in 15 dbj. If we have husky enough antenna signals, this system could simply be an extended version of the "Break Even" system. If not, we'll need an antenna mounted DeSnower preamplifier. It is apparent that the whole arrangement depends simply on how much signal is available at the input of the ABD-1.

# JERROLD

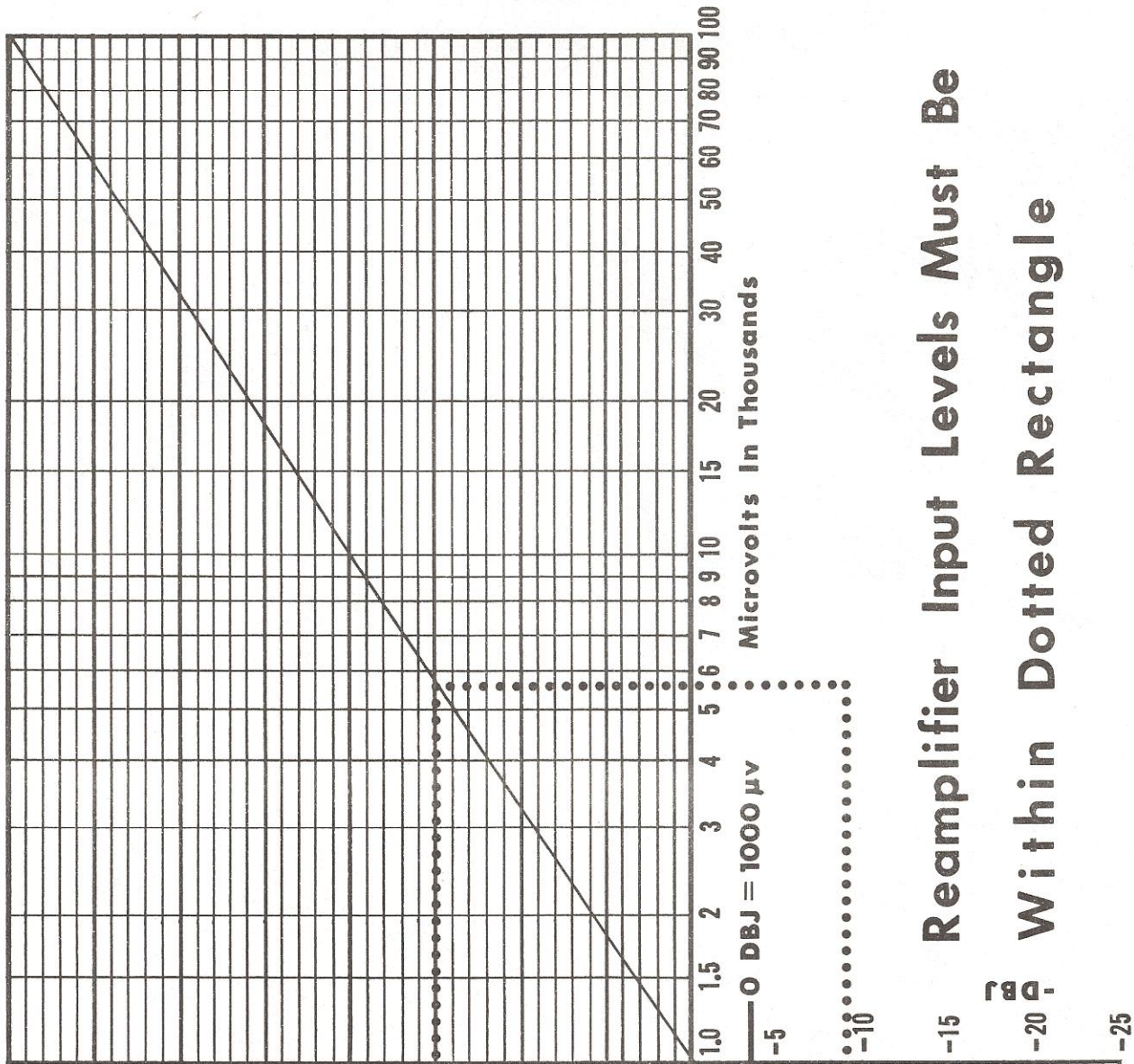
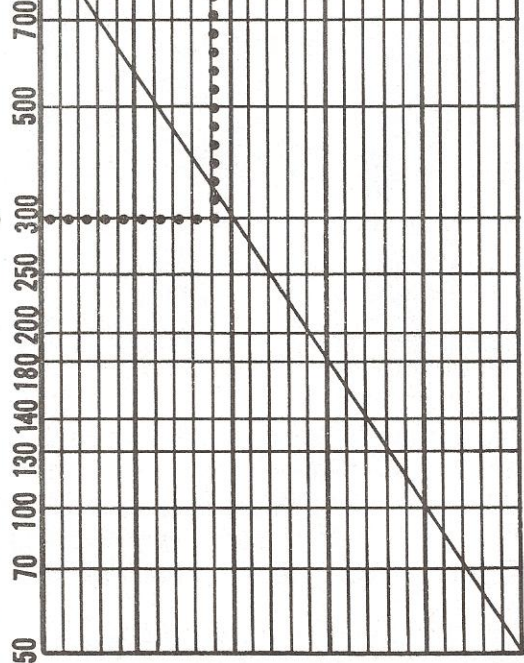
## multi-outlet reamplifying guide

Maximum  
Amplifier  
Output

+ dB

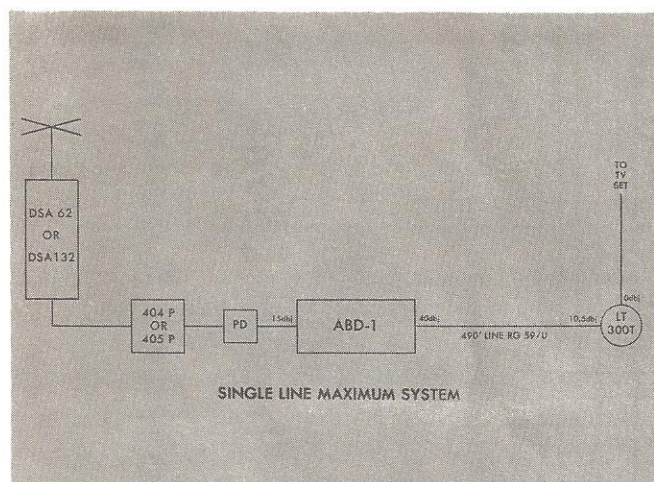
Maximum  
Amplifier  
Input

Microvolts



Reamplifier Input Levels Must Be  
Within Dotted Rectangle

Let us assume that we need the preamp and wish to run a single long line with an LT300T at the end. The configuration would look something like the drawing below.



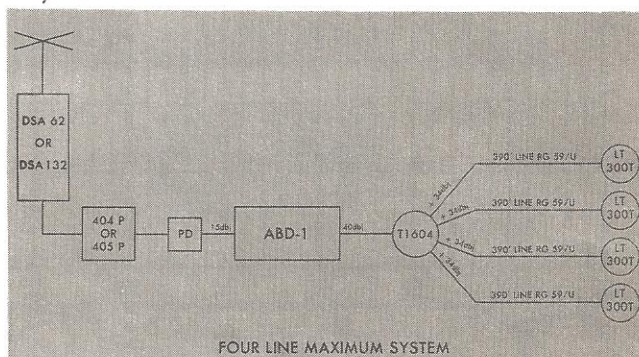
Starting with the signals measured at the antenna, we build them up 25db in the DSA 62 or DSA 132. If the signal leaving the DeSnower power supply is greater than 15dbj (see warning line on chart) we are in danger of overloading the ABD-1. We must then insert PD pads of the correct value to reduce the signal to 15dbj. Example: Assume a measured antenna signal of 600 microvolts (at its peak in the fringe area). Remember that signals can be 250 microvolts at 3 in the afternoon and 600 microvolts at 10 in the evening. Be sure to consider the STRONGEST signal when cascading amplifiers or you may have beautiful pictures when you normally work and miserable pictures when your customer normally looks. For this reason it is recommended that the "maximum system" be used only in areas where signals vary within narrow limits. Of course, you can cascade amplifiers, but you must reduce your feeder lines by the amount of the signal shift. For example, if the signal goes from 300 to 600 microvolts in a day then you have a 6db shift (see chart). This means that you must cut 100 feet off your 490 feet maximum, and design the system so that pictures stay out of the snow during the day . . . and the input to the ABD-1 stays below +15 dbj at night.

Getting back to our example: A 600 microvolt signal = -4dbj. Increasing this by 25db puts us at +21dbj on the chart. Notice that this is beyond the overload point of the ABD-1. Therefore you must insert a PD6 between the ABD-1 and the DeSnower preamplifier.

We now have arrived at the levels of our "maximum system". Starting with the 40dbj at the output of the ABD-1, the signal can be attenuated 40db and still arrive at a receiver with zero dbj or 1000 microvolts. Since we know the attenuation of the LT300T (10.5 db) and the starting signal, we have only to find the maximum allowable cable loss. Thus,  $40 - 10.5 = 29.5$  db of cable loss which is the maximum cable loss that we can insert. It's merely a matter of adding up the total losses in db on the way to the receiver and seeing that they are equal to or less than the starting signal in dbj.

We have now calculated our maximum allowable cable loss of 29.5 db. Converting this to feet is simply remembering that at channel 13 the loss for RG 59/U is 6db per 100 feet. Divide 6 into 29.5 and we find that we can run about 490 ft. to an LT300T. Now, if we want to distribute signals to more receivers or use more than one distribution line, we apply the rule we established before—add a tap, shorten the line 5 feet; add a splitter, shorten the line 100 feet.

Thus we might come up with something like the layout below.



At this point it might be well to keep in mind that we have figured all of our cable losses, etc., on the basis of running channel 13. If we use some other cable with lower loss, the calculations are the same. Merely divide the 29.5db allowable loss by the cable loss per 100 feet and the answer tells you how many 100 foot segments of the new cable you can run. If channel 6 is the highest channel you will run, then all distances can be DOUBLED. It might be well to point out that even though you have only low band channels in your area now, future UHF channels will have to go some place. Therefore it is wise to allow for conversion of future UHF channels to the open spaces in your VHF system. Limiting your system to channel 6 limits your open spaces.

## MOUNTING EQUIPMENT

### Erecting Antennas

Antenna problems have been discussed in this manual as a guide to the selection of the proper type of antenna. The physical erection of the antennas will, of course, be determined by the type of antennas employed, how high it is necessary to raise these antennas in order to obtain sufficient signal, and the type of building on which the antenna is being installed. Good antenna installation practice **MUST** be observed, with emphasis on the following points:

1. *The mast must be thoroughly grounded with at least #8 ground wire, which is run directly to a cold water pipe. NEVER ASSUME A VENT OR A HOT WATER PIPE TO BE A GOOD GROUND.*
2. *The lead-in connection to the antenna should be covered with weatherproof compound.*
3. *Any screws on the antenna must be tight. Loose antennas or elements can be a source of intermittent trouble.*

### Cable

In all installations coaxial cables are used for signal distribution. The cables may be run through building vents, hallways, or may be run on building exteriors. Care should be taken in handling coaxial cables. They should not be bent sharply, run over rough edges, or subjected to extreme temperatures. They should be anchored securely on long runs to prevent any strain. **THE SPLITTER AND LINE TAP UNITS** may be mounted in almost any convenient place. They are designed for flush mounting either on a wall, stud, joist, etc.

### Wiring the Building

In the building, the feeder cables may be run vertically through stairwells or closets, or horizontally along the attic or through the basement. In installations where it is not practical to run cables inside the building, the RG 59/U cables may be run outdoors. They may be run in conduit along the roof, or in rings along the parapet of the roof, to a point over the window nearest the receiver. At this point the cable is dropped over the roof and down the outside of the building, making certain that wherever the cable comes in contact with any part of the building it is covered with tape or rub-

ber hose to prevent abrasion. The cable is clamped to the side of the building by means of cable clamps, and made secure against wind whipping. It is imperative that every feeder cable be terminated with a 72 ohm resistor; therefore the last tap off unit in the feeder must either be an LT 300 T, or an LT 75 T. These units combine a line tap off with a built-in terminating resistor.

### Locating Amplifiers

The ABD-1 may be located in an attic, basement, or other convenient place. However, care should be taken to see that the location picked is fairly centralized, so that feeder lines will be of approximately equal lengths. It is desirable to have the amplifier mounted reasonably near the antennas, to maintain a fairly high signal to noise ratio. In strong signal areas, of course, this is not necessary, and the installer can be less critical of the location of the amplifier. For example, in a dealer's store in a metropolitan area, it will generally prove convenient to have the amplifier in an accessible location near the receivers, or in the dealer's service shop.

### Mounting the Amplifier

The ABD-1 may be mounted either horizontally or vertically. Horizontally it may be simply laid on a shelf, table, etc. If vertical mounting is preferred to save space, the ABD-1 may be hung on a wall with two support screws, by means of the two slotted holes in the extending lip. In any case, the equipment should be mounted so that it is convenient to service, but not accessible to unauthorized personnel.

**CAUTION:** Any piece of the electronic equipment generates heat when in operation, and requires some ventilation. If the ABD-1 is mounted in a closet or other closed-in space, care should be taken to provide adequate ventilation. The amplifier and any associated equipment should be grounded to a cold water pipe or to the electrical conduit system of the building.

### Connecting the Receivers

The link between the system and the receiver is the tap off unit. This may be either an LT 300 or an LT 75, depending on the receiver or the choice of the installer. The tap off unit itself may be flush mounted on the baseboard or the wall near the receiver.

*For instructions on connecting a receiver to a tap unit, refer to instruction sheet packed with each unit.*

# BALANCING AND ADJUSTING SYSTEM

## Test Equipment

1. Volt-ohmmeter for checking continuity of all antenna leads and coaxial cables. Also used for checking 72 ohm termination.
2. Jerrold Model A-72 Variable R-F Attenuator. This is very useful for balancing the system and determining quickly the value of P-D Pads to insert in the amplifier input leads.
3. Television receiver to be used for orienting antennas, checking for interference, and making point by point checks of picture quality.
4. Field Strength Meter Model 704A. This is a highly desirable instrument to have in checking out the system. Permits accurate measurements plus or minus .8 db from 5 microvolts to 3 volts. Continuous tuning over entire frequency range from 54 to 220 megacycles.

## Orienting Antennas

Antennas should be selected for maximum gain and directivity. Determine the type of antenna needed for the installation, then observe these instructions:

1. Check antenna lines for continuity with the volt-ohmmeter.
2. Connect TV receiver to the antenna.
3. Orient the antenna to obtain sharp, ghost-free pictures on each channel. In extremely strong signal areas it will be necessary to shield the receiver being used in order to prevent any direct pick-up in the receiver from interfering with the antenna signals being observed.

## DMN Networks

If DMN units are used, 72 ohm coax will be needed from the antennas to the DMN input connectors. Since almost all commercially available antennas are of the 300 ohm variety, a balun must be used to match the antenna to the line. See Appendix "A" for information on constructing baluns. Connect transmission lines from the individual channel antennas to the proper fittings

marked "antenna inputs". Terminate all unused input fittings with Jerrold TR-72 terminating resistors. Connect the output of the DMN to the input of the amplifier.

## Amplifiers

When balancing the system, the test equipment should be arranged and connected as shown in Figure 1. First, assuming that DMN's are being used, the highest channel antenna is connected to the DMN. The test receiver is tuned to the proper channel, and the fine tuning control is rotated on either side of maximum sound. If a 60 cycle buzz is heard, chances are the amplifier is overloaded. Switch in sufficient attenuation into the A-72, until this buzz is eliminated. Record the amount of attenuation required and replace the A-72 with a fixed attenuator Model P-D Pad equal to or slightly greater than the recorded attenuation on the A-72. Proceed by connecting the next highest channel. If cross-modulation (frames sliding across picture, or severe beat pattern) is observed on either of the two channels connected, add sufficient attenuation into the antenna line of the offending channel to eliminate it. After all the antennas are connected and adjusted, any remaining interference due to cross-modulation may be located by disconnecting the antenna which appears to have the strongest signal, and observing the effect on interference. If this channel was the offender, attenuate it sufficiently with P-D Pads to remedy the situation. Remember that it takes only one strong channel that exceeds the rated maximum input, to overload the output tube of the amplifier, and cause interference and cross-modulation on all channels.

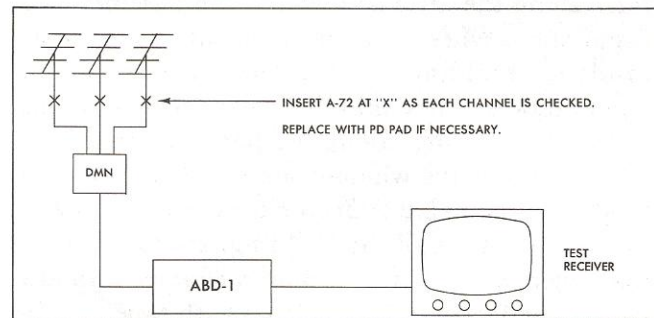
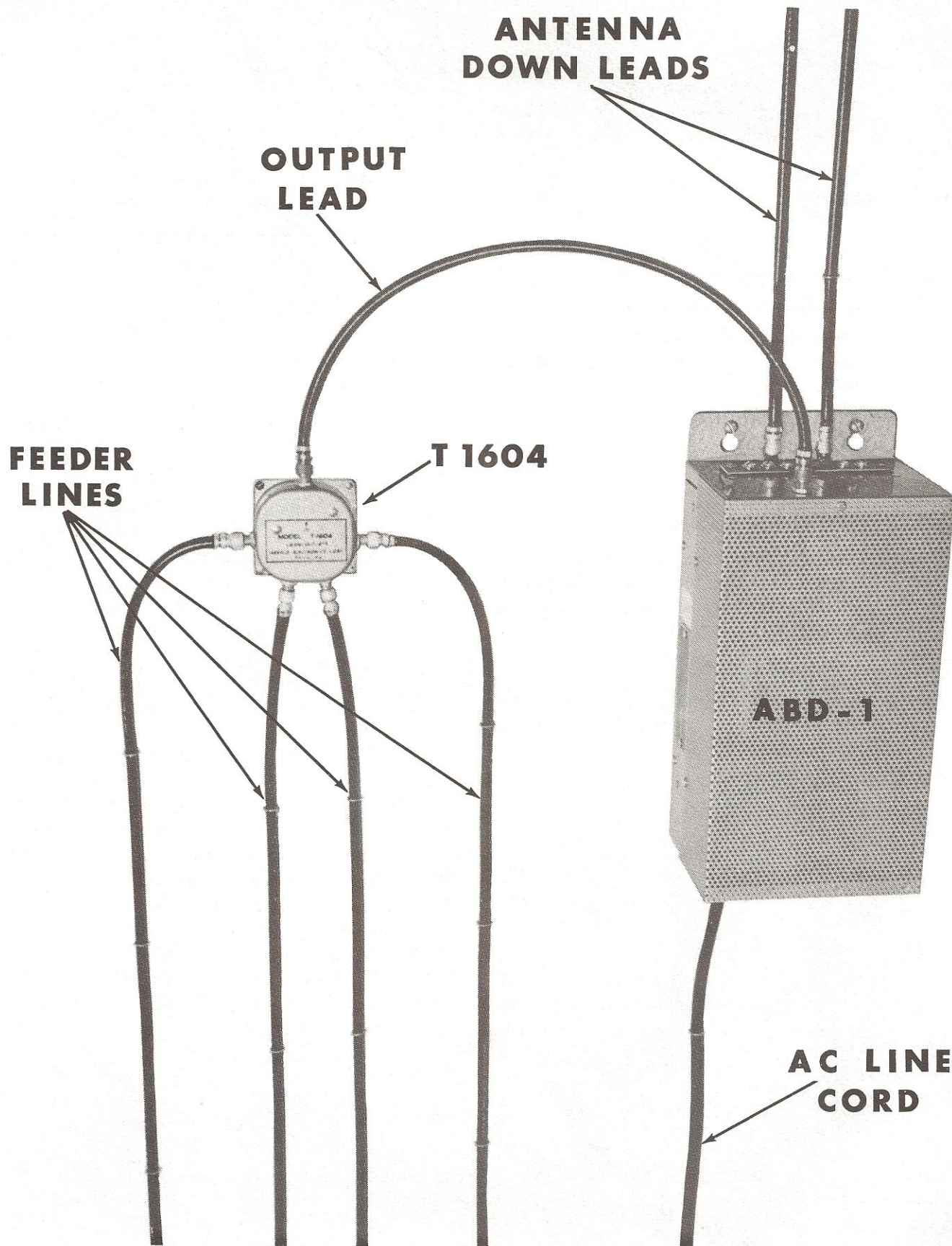


Figure 1



JERROLD MULTI-OUTLET HEAD END EQUIPMENT

# MAINTENANCE

If trouble occurs after the system is in operation, check as follows:

## 1. NO SIGNAL FROM AMPLIFIER

- a. Check fittings of amplifier and cables
- b. Disconnect inputs to amplifier and measure antenna signals; if O.K., then trouble is in amplifier
- c. Check tubes in amplifier. Replace one tube at a time, reinserting original tube if good. If anything other than tubes has failed, see service section for information.

## 2. LOSS OF ONE CHANNEL

- a. Check the antenna and the DMN units. This trouble cannot be due to the amplifier. If DMN unit is found to be defective, check for open leads or defective fittings.

## 3. CROSS-MODULATION

- a. This is due to unbalance of the signal input to the amplifier. See section on balancing and adjusting system.

## 4. GHOSTS

Ghost images on a master antenna system may be caused by:

- a. Antenna pickup of reflections. This can only be overcome by proper selection and orientation of antennas.
- b. Improper termination of cables. Check all cables to make certain they are terminated properly with either a terminating type line

tap unit, or Jerrold TR-72 Terminating Resistor. Also check all fittings and splices to make sure they are made properly.

- c. Direct pickup of signal by receiver. When a Jerrold Multi-Outlet System is installed in the vicinity of a transmitter and signal strengths of more than 5000 microvolts are on the antennas, the problem of direct pickup may arise. This is signal picked up by the receivers themselves along the length of 300 ohm twin lead that connects the tap off unit and the tuner. The problem results from an out-of-phase condition between the direct pickup signal and the signal received from the line tap. It manifests itself as smear in the picture, leading ghost, multiple ghost, or unstable sync. If the signal from the transmitter is very strong, it may be necessary to replace the LT300 with an LT75 and run coaxial cable directly to the receiver. In some models an elevator transformer is provided at the tuner. Arrange the connections on the transformer for 72 ohm match, and run the RG 59/U directly to the tuner.

In receivers with no 72 ohm provisions, either a T-372 or an ST1601 can be used. The choice is up to the installer. The ST1601 matches 72 ohms to 300 ohms with unity gain, and the T372 matches 72 ohms to 300 ohms with a gain of 6db. (This gain may also be utilized to extend runs from the LT75.) The matching unit, whichever is used, should be mounted as close as possible to the tuner. If possible, mount it right on the chassis or the tuner.

**CAUTION:** *DO NOT mount matching unit on a chassis of the AC-DC or transformerless type which is connected to one side of the AC line. Damage to the receiver and the system may result.*

## SERVICING THE SYSTEM

Qualified technicians can service Jerrold Multi-Outlet equipment readily with proper test equipment. The mixing networks, line tap off units, P-D Pads, splitters, etc., rarely, if ever, cause any trouble. If inoperative, check for open leads, loose fittings, or mechanical defects. Schematics and instruction sheets furnished with DeSnower equipment will facilitate servicing these units.

Employing low noise, high gain, cascode and cascade cascode input circuits and high gain pentode output circuits, the ABD-1 is designed to give long, trouble-free service.

If trouble should arise, standard TV trouble shooting procedures may be employed, consulting the following schematic, voltage and resistance charts.

Since the ABD-1 is a wide band amplifier, alignment should not be attempted in the field unless special wide band sweep equipment is available. For best results, return to Jerrold Electronics Corp., 26th and Dickinson Streets, Philadelphia, 46, Pennsylvania.

## VOLTAGE CHART

PIN 1	2	3	4	5	6	7	8	9
<b>V1</b> 108	0	1.36	0	6.3AC	108	0	1.2	0
<b>V2</b> 0	1.6	0	6.3AC	110	110	0		
<b>V3</b> 105	0	1.15	0	6.3AC	105	0	1.1	0
<b>V4</b> 107	0	1.05	0	6.3AC	107	0	1.07	0
<b>V5</b> 0	2.2	6.3AC	0	109	109	2.2		

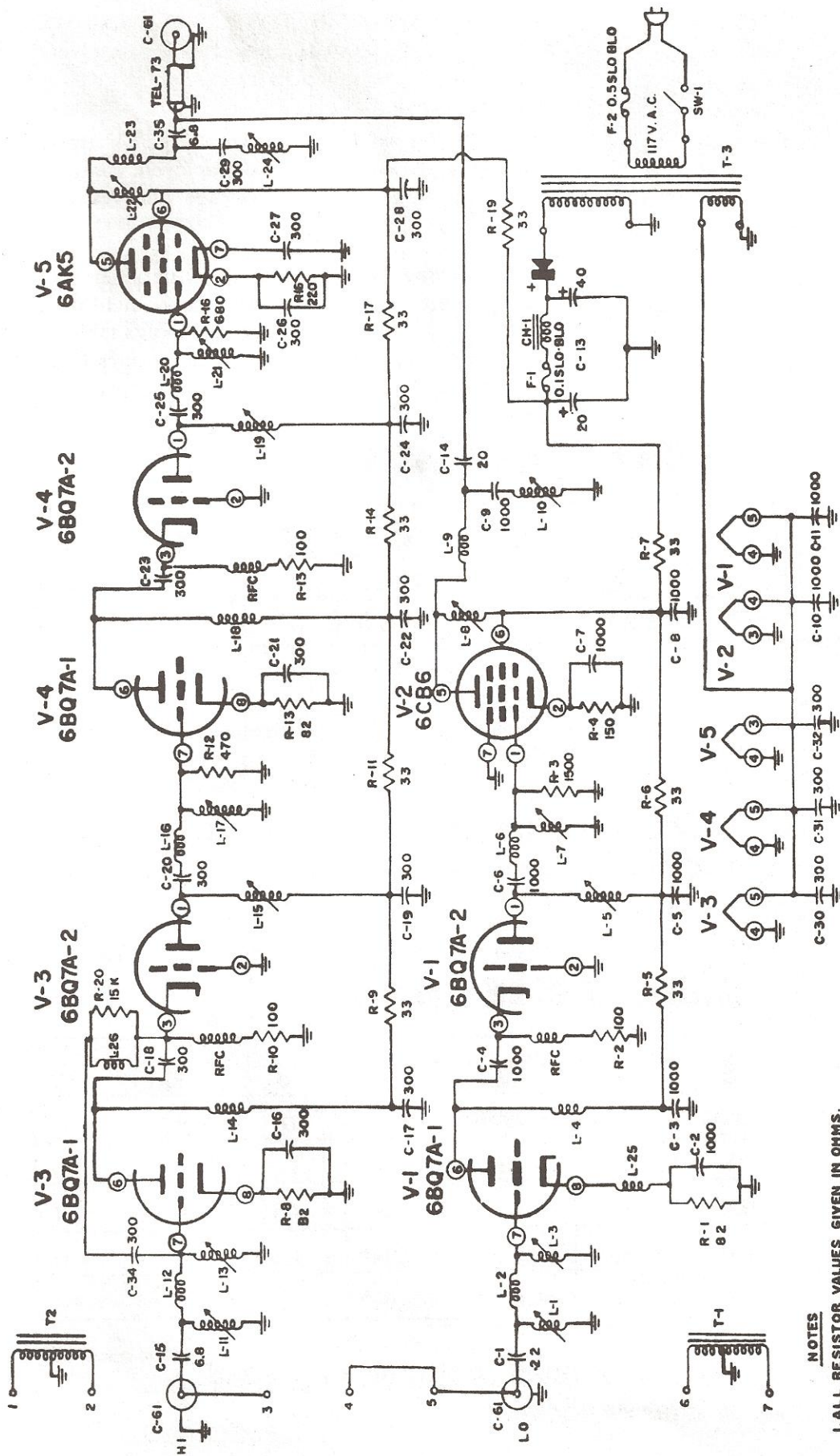
All readings given are DC voltages except where indicated and are taken from the indicated point to ground, using a 20,000 ohms/volt meter.

## RESISTANCE CHART

PIN 1	2	3	4	5	6	7	8	9
<b>V1</b> 100K*	0	104	0	.08	100K*	.01	82	0
<b>V2</b> .01	150	0	0	100K*	100K*	0	—	—
<b>V3</b> 100K*	0	101	0	.1	100K*	.01	82	0
<b>V4</b> 100K*	0	101	0	.08	100K*	.01	82	0
<b>V5</b> .01	220	.06	0	100K*	100K*	220	—	—

All values given in ohms from point indicated to ground.

\*Denotes charging of filter capacitors.



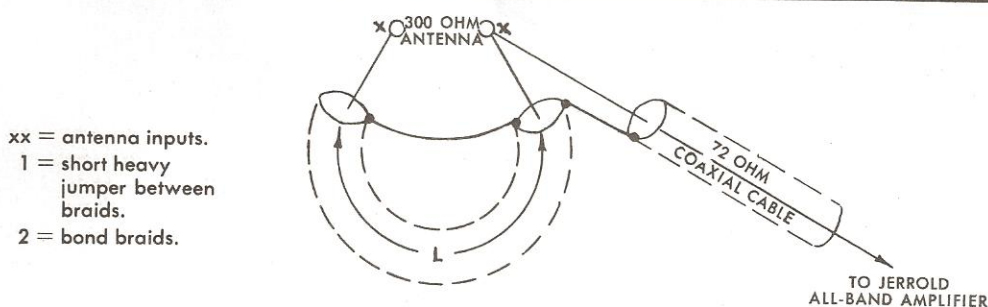
SCHEMATIC ABD-1

- NOTES
1. ALL RESISTOR VALUES GIVEN IN OHMS.
  2. ALL CAPACITOR VALUES GIVEN IN  $\mu$ MF.

## APPENDIX "A"

### CONSTRUCTION BALUNS

When connecting a 300 ohm antenna to 72 ohm coaxial cable, an effective method of matching the cable to the antenna is by using the  $\frac{1}{2}$  wave length balun, as shown below:



Channel	2	3	4	5	6	7	8	9	10	11	12	13
"L" in inches	68½	61⅞	56½	49¾	45¾	22	21¼	20¾	20	19¾	18¾	18¼

## Warranty

The ABD-1 is warranted against defective workmanship and material for a period of 90 days from the date of sale. Should any defects arise during this period we will immediately repair or replace the unit upon our inspection of it.

Here's a TV Multi-Outlet System that allows the installer maximum profit from his master antenna system installations.

**DESIGNED** to cut installation time

**ENGINEERED** for simplified layouts

**PROVEN** for snow-free reception

**BACKED** by experience in over 8000 building systems and 80% of all community antenna systems.

Jerrold Electronics Corporation  
26th & Dickinson Sts., Phila. 46, Pa.

JERROLD