# Tech. Tips

# A Publication Especially for Operators and Technicians who service Arachnid Products

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This publication is provided as an aid for field technicians and operators who troubleshoot, repair, and maintain Arachnid games. It is a technical tool designed to keep all the latest updates, service bulletins, suggestions, and ideas together in one neat package.

Your input is welcome. If you have a special idea or tip you would like to share, send it to: It will be reviewed and considered for publication.

HAVE A TECHNICAL QUESTION OR PROBLEM? Call us at 1-800-435-8319 and ask for Technical Service. We'll be happy to assist you in any way we can.



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## Gotcha! New from Arachnid



Just when you thought it was safe to go out and play darts (you were beginning to master the strategies of Wild Card Cricket and Bermuda Triangle), Arachnid "Gotcha" again!

Introducing Gotcha! a new action game for two to four players, which challenges your strategy skills in a different and exciting way.

The object of the game is to be the first to get from 0 to 301 points, without going over. Players try to match the score of their opponent(s) with each dart thrown. Every time there is a match, a bomb is detonated which destroys their opponent's score and puts it back to zero (up to 3 bombs may be detonated per round). If as you approach 301 points, you go over, the amount exceeded will be deducted from your original score, and no matching bomb, if earned, will be detonated for that throw.

For an additional challenge, there is also an expert's game option, which requires players to reach their final score of 301 with doubles, triples, or the bullseye only for the winning shot.

Gotcha can be set to play up to 35 rounds.



# DARTMAN III... What's the SRC Field? (& other "Hidden" Features)

Along with handicapping capabilities, new league game options, and easier-to-use report screens, Dartman III also has incorporated into it many less obvious improvements, which are so subtle, that they are almost "hidden".

#### Dartman III "Configuration"

≤Modem> - Clicking (or pressing Enter) on this word will cause a screen to appear in which the initialization string for the modem can be changed. This is not normally necessary, but for certain systems our default string may not work as well as something else. Contact Arachnid for more information. <u>Tone/Pulse</u> - This refers to the phone line that your computer is connected to. The question has been moved from the modem calling screen to here. Usually, it is set to "Tone".

#### The ''Leagues'' Menu

Active - If the X is removed from this field, then the league's locations will no longer show up on the modem phone list. This helps avoid unneccessary calls or time consuming phone list cleanup every week. League stats are not affected,

Combine Player Stats - This is found under "Custom Reports". This option will allow you to show all feats for Cricket and X01 on one line...but be careful! When an X is placed in this box, ALL the old column guide numbers will be set to 0, and cannot be recovered. You will then have to reassign sequence numbers for all columns in both categories.

#Teams - This used to be a critical field...it had to be correct for scheduling to work properly. Now with Dartman III, the program will count the # of teams at the time a schedule is being created, and actually update this field if it is not correct.

#### The "Locations" Menu

Phone numbers - There is now a place to put both voice and modem dialed phone numbers, so the modem number can be entered exactly as it needs to be dialed.

Call Time - When generating a phone list, a default call time is put in for all locations. However, if a location needs a call time other than the default, it can be entered here. This will override the default time. Be sure to use a 24 hour format.

continued on back page

## Inside Wiring Maintenance, Part 2

This article has been reprinted with permission of the author, D.B. Levels, and T & L Publications, publisher of Nuts and Volts Magazine, 430 Princeland Court, Corona, CA 91719. This is part 2 of a 3 part article on phone line wiring and maintenance. It is being provided to you as a learning tool. In today's coin-op world of phone lines, networks, and modems, knowledge of phone installation, service, methods, and applications can be an invaluable tool to technicians in the amusement field. Part 1 was included in Tech Tips, Spring '96. Part 3 will be included in a future Tech Tips issue.

gs are that of a neighbor, trouin the telco network. If you modern style NID (network es device, as detailed in last article, simply disconnect all wring, connecting a test set or to the telco network jack. If xtalk persists, confact telco repair service. If your demarc is not an NID, you can still deconnect CPE wiring, but use care where re-connecting CPE wiring. Most stalk trouble reports are caused by improper wiring and/or improper installation of CPE lation of CPE

If other voices sound almost as loud as your own, two telephone lines are probably crossed by physical contact. This was a common problem in older

crosstalk will be traced to CPE facilities, yet no physical crosses can be measured. This represents the largest number of crosstalk complaints for customers with two or more lines. The problem stems from the type of IWs (inside wiring) selected for installation. There is a difference between telephone "wire" and tele-

phone "catele."

Over the years, many types of wiring have found their way into the telephone network. It is not uncommon to discover the use of: romex electrical wire, thermostat wire, antenna lead, and other types of wiring installed in homes and s businesses serving extension jacks, loud ringing bells, etc. These types of wiring all share a common trait: parallel con22 gauge. This becomes increasingly important when installing long runs of IW in factories, hospitals, large offices, etc. Longer runs are exposed to more noise sources and will be more susceptible to xtalk. Imbalanced pairs due to open conductors in bridged legs of cable will also increase the concontruit for xtalk.

increase the opportunity for xtalk.

Another cause of xtalk is a condition I refer to as "cordextrus." This problem is caused by the need for extension tele-phones without the desire to install new cabling and Jacks. Manufacturers are selfing extra-long line cords (the flat, grey line that connects the telephone to the wall lack), offering "do it yourself" kits for installing additional jack locations. The cords are offered in lengths up to 25 feet and can be extended via couplings to

# **Inside Wire Maintenance** — Part 2

∍his month, we will examine more difficult noise prob (radio frequency interference). Since these problems are usually intermittent, they can be difficult to resolve. Recording times and dates of occurrences will great by improve your chance of successful mitigation of the trouble. Let's begin with a look at the fastest growing complaint:

Crosstalk (xtalk) is the ability to hear other persons on your line during a normal conversation. This trouble has increased in recent years, and generates many trouble reports. Let's draw a distinction between xtalk and RFI.

With RFI, you also hear others on the line, but can usually determine the pattern of a radio transmission, such as ham or CB. RFI from a commercial radio station is also easily identified. On the other hand, stalk sounds just like another hands are conscreptive to the literature. telephone conversation, including sig-nalling components such as tone dialing, ringing, and data from fax machines or

When a customer complains of crosstalk, the first question asked is "Do you have a cordless phone?" When the answer is yes, many technicians feel they have isolated the problem because cordless phones have developed a bad re less phones have developed a bad repu-tation and many troubles are blamed on this instrument. While cordless phones do introduce, some element of interfer-ence, it is wrong to blame this technology for every noise/xtalk problem.

#### **WARNING!**

Use caution when testing telephone lines and equipment. Normal 50 VDC @ 60 mA will jump to 90-130 VAC during ringing cycles. Additionally, longitudinal currents due to power line induction can lead to dangerous voltage levels. Use insulated equipment and avoid contact with wiring and test points.

The key to correcting stalk is to identify the origin of the offending signals. If the signal is voice, try to communicate with the other party(s) to deter-

the other party(s) to deter-

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10A2 "key system" telephones using "key strips" and the

cross only appeared when a certain line button was depressed. This created an intermittent trouble since the problem would disappear when the buttons were

would disappear when the buttons were returned to the normal (up) position.

The best way to troubleshoot crosstalk in older type key equipment is to identify the location of all telephones. Your helper should access the most commonly used phone and place a call on the troubled line. Test every phone on the system by depressing each line button with handset lifted. You will locate a phone that, when a certain line button is phone that, when a certain line button is depressed, causes crosstalk. Replacement of the keystrip will correct the problem.

Line connections at your home may also be crossed at jack/splice locations or may be crossed in the NID. To test for physical line crosses, disconnect all CPE by removing the RJ11 plug at the NID. Measure all lines with a volt chmmeter, looking for leakage resistance between conductors. As we discussed last month, electronic telephones exhibit a characteristic resistance signature. In fact, modern two-line electron-

ic telephones may appear to have high resistance crosses between lines. Since this is a normal attribute for phones disconnect them while testing for line crosses.
Again, if crosses are on the network side of the demarc, contact your telco repair ser-

#### by daniel b. levels

will cause xtalk

A telephone e (inside cable (inside wiring and telco cable) is made up of paired wires. Two wires are manufactured with a definite twist around each other and then jacketed with other pairs. The twisting method is utilized to eliminate the inductive coupling effect of parallel conductors. Using parallel (non-paired) wiring is acceptable for single line installations, but employing this wiring design with two or more lines will cause stalk.

cable

Telephone wiring is available for inside installations designated as "four wire" or "four conductor" cabling. This is parallel construction wiring and is not intended for multi-line installation. Originally, these cables served extension Originally, these cables served extension phones, and the third and fourth conductors provided low voltage AC power to lighted dial and keypads.

For multi-line installations, select a cable identified as "two pair" or "three pair," etc. (see Figure 1). The conductors will be "install" and the cable identified as "two pair" or "three pair," etc. (see Figure 1).

will be "paired" or twisted into separate

will be paired to twisted into separate lines.

The longer the cable length, the more important this principle becomes Avoid 26 gauge wiring with paper-thin insulation. The preferred cable is 24 or

allow 50+ feet of line cord to serve tele

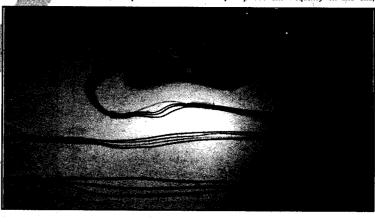
allow 50+ feet of line cord to serve tele-phones or other devices.

The appeal of low cost and no instal-lation charge is hard for many to pass up. For single line installations, these cords can offer noise and static after being exposed to the mop, heel, and vacuum cleaner. However, when used as exten-sion cords for modern, electronic two-line phones, these cables offer high levels of

The line cord does indeed have four conductors, enough for connecting two lines. The middle two conductors serve line one, the outer two conductors line two. Therefore, the conductors for line two are straddling line one. When installed for two-line operation, Fax machines and PC moderns bleed over on machines and PC modems bleed over on these cables every time! If you employ two-line phones, use the six foot cord ONLY and do not use extension line cords. Avoid using these cords to serve several devices for multi-line service. Instead, install twisted pair cabling (IWs)

terminated onto RJ-type jacks.

The following laboratory experiment will illustrate the difference between various types of wiring. Xtalk can be mea-sured by transmitting a signal of known amplitude and frequency on line one,



while measuring with a frequency selective meter on line two of the same cond/cable. In our tests, we employed a Hewlett Packard 3336B Synthestzer/Level Generator and matched 3586B Selective Level Meter

(see Figure 2).

Desired results would be 100 dB separation between lines in the same jacket (line cords, IWs, etc.). This will never be achieved in practice, and typical results for twisted pair yield separation of more than 80 dB. Typical readings for line cords are in the 50-60 dB range, as illustrated in Figure 3. Notice the consistent 20 dB improvement of twisted pair over line cords. Also notice that parallel wiring is an improvement over line cords, but doesn't come close to the perfor-mance of twisted pair.

Using a typical two-line installation, let's consider the effect of utilizing line cords, rather than twisted pair wiring. The cumulative effect of employing line cords will cause a significant change in the level of electrical separation (xtalk) between line 1 and line 2. The result is a xtalk figure of 55-60 dB.

xtalk figure of 55-60 dB.
Dial tone is generated at the telco
CO (central office) or remote unit at
approximately -15dBm. Additionally, the
local loop will account for an average 5
dB (8.5 dB, max) of signal loss, amounting to a -80 dB xtalk signal presented to
the telephone instrument. While this signal would be negligible to older, passive
instruments, modern telephones contain
operational amplifiers, producing 5 dB to
10 dB of gain. The result is a signal in the
70 dB range, which can have an interfer-70 dB range, which can have an interfer-ing affect on normal conversations in a quiet room. Actual Bell Labs studies have determined that signals down to -90 dBm (0 dBrnc) can cause interference

(0 dBmc) can cause interference.

Tone dialing signals are transmitted at -6 dB to -7 dB, resulting in a xtalk signal of -62 dB. With amplifier gain, this signal approaches -55 dB and is easily heard during a normal call. Similarly, fax machines and PC modems transmit signals in the 1.7-2.5 KHz range. While these signals are transmitted at appropria these signals are transmitted at approxi-mately -10 dBm, notice the increase in xtalk at frequencies above 2 KHz. These signals are also easily detected.

The previous information should The previous information should convince you to install twisted pair IWs for multi-line installations. Since many employers are encouraging the "Work at Home" ethic, there has been a significant increase in orders for additional lines at homes and small businesses. There has also been a significant increase in the number of xtalk complaints. Now you know who!

We'll break here for an admission that the telco is responsible for some xtalk complaints. The most common cause of xtalk in telco facilities is "split"

SNC Manufacturing Co., Inc 101 Wankan Ace. Oshkosh, WL5 1901 114 231 7370 Coil Sales & Mtg

cable pairs. This occurs at a splice location where one side of a line is inadvertently spliced to one side of another line (see Figure 4). If the pair is "re-

split" at the terminating ocation, the customer will experience xtalk (if not re-split, they will experience no service). Pairs may also be split on a side leg of cable and cause this condition These problems

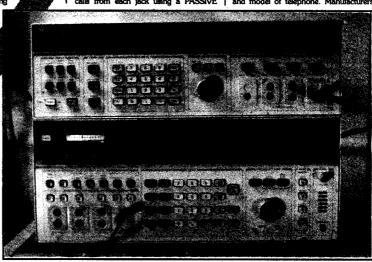
seldom occur and are corrected when dis-covered. You will cause the same problem in your own cables by splitting pairs. Split pairs also cause frequency response problems for response proble modems and fax machines.

Special terminal equipment such as radio tele-patch or telemetry transceivers also cause xtalk. This equipment allows the output level to be manually adjusted from -30 dBm to +10 dBm. When oper-

ation becomes erratic, many technicians merely crank up the gain, causing the signal to bleed over onto several lines. The output should never be adjusted "hotter" than 0 dBm. If a stronger signal is desired at the far end of the circuit, the telco engineering department should design a system with gar repeaters at select office locations. RFI is becoming a gained select

frequent complaint in urban areas. Not only are more people involved in radio hobbies, modern telephone instru-ments are excellent radio receivers. As these two worlds col-lide, the telephone user suffers the most aggravation. Older tele vation. Older tele-phones were passive instruments with one or two nonlinear elements to contend with (duo-diode click filter in handset), but newer phones are microchip and and microprocessor controlled magic! Unfortunately, they also demodulate radio sig-

This can be a most difficult probl This can be a most difficult problem to correct, but RFI can be eliminated if these directions are followed in a step-by-step manner, i.e., don't skip around. First, determine if the radio signal is being picked up via IWs and telephone instruments (fax machines, PC modems, answering machines, alarm systems, subo-dialers) or if they are being delivered to you via teleo cables and wiring. Disconnect all IWs and telephones at the demarc device. Connect a PASSIVE instrument to the test jack and place a call while listening for RFI. If no interference is present, reconnect all IWs but leave all phones unplugged. Place test each jack using a PASSIVE this service (probably not for free). It used to be feasible to build filters and RF traps into the phone at the field location, but since de-regulation, it is not practical to make such modifications to every make and model of telephone. Manufac



instrument, again listening for RFI. A passive instrument is an older style phone, preferably with a rotary dial. This must be preteratory with a rotary dual. This must one a known good instrument, as a high resistance component (such as a dirty contact) may act as a RFI detector. If RFI is now being detected, your station wiring is acting as an antenna and "tuning" you into the interference. (More on this in a

#### gure 2 Meniuring Kall

should design and build instruments that will function properly in the real world.

Again, since few customers ever experience this problem, it is not cost-effective to build RFI rejection into every teleto build RFI rejection.
phone model.
If RFI is present at the telco demarc
with ALL IWs and electronic phones disconnected, call local
repair service. They
will test their cables

for open sheath bonds and proper grounding and, if nec-essary, install an RFI filter at the demarc. Just as with xtalk, it

is helpful if you can determine where the RFI originates and what frequency is being transmitted. When the interferwhen the interfer-ence is in the com-mercial AM/FM bands, this is fairly simple. If you suspect ham or CB radios, ham or CB radios, check around the neighborhood for a new antenna. Once you feel you have located the transmitter, ask the radio operator to perform a feet broadcast with test broadcast with

you to determine the interfering frequency(s). Most legitimate interfering frequency(s). Most legitimate radio operators will be glad to help out. They don't desire the neighbors blaming them for a problem. Remember, the problem is with the design of your phone, not his/her radio. Let me qualify that: lilegal power levels and/or improper radio/antenna installations will cause harmful (noise) interference and do NOT fall under the control of the local telco. The FCC will not accept a second party

**XTALK RESPONSE** Twisted Pair/Parallel Wire/Line Cord Xtalk measured in dBm 100 20 1000 1850 2100 2250 3000 Wiring Type Twisted Pair --- Parallel Wire --- Line Cord Transmit - Line 1 OdBm 600 Ohm Z Receive - Line 2 BW-20Hz 600 Ohm Z Pigure 2 Kialk manyen for wiring types

If no RFI is present, connect tele-

If no RFI is present, connect tele-phone equipment one at a time while lis-tening for RFI. You will determine that one or more of the instruments are sus-ceptible to RFI. In many cases, the phones are not picking up the signal from the IW or cable, they are picking up sig-nals from free air, just as your AM/FM radio. Ask the telephone manufacturer to modify your equipment to reject RFI. Many domestic companies will provide

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complaint, but must be contacted by the end user. The most recent decision by the understaffed FCC is to only investigate the most serious infractions and they will

the most serious infractions and they will urge you to try several mitigation techniques to resolve the problem. They are well aware of the problem associated with some phone designs relative to RFI.

Knowing the offending frequency may hold the key to correcting your problem. Determine the wavelength (in feet) of the frequency by the formula: X = 300/f (in MHz) 3.28. Where X = wavelength in feet, 300 is a constant for velocity, f = frequency (in MHz) and 3.28 converts from meters to feet. Consider CB Channel 19, a once popular frequency for traveling. a once popular frequency for traveling. Ch. 19 is 27.185 MHz, therefore, 300/27.185 = 11.03 (meters) x 3.28 =

What is the length of each of your station wires? One may be very close to 36 feet (with line cord) and is the exact wavelength of the transmitted frequency, making your phone a perfect receiver. To correct the problem, splice an additional 20 feet of IW to the existing 36-foot section and "de-tune" the antenna. The other consideration is if the IW is a fraction or a multiple of the offending wave-length. This interference occurs when you are in close proximity to the radio propagation pattern may have a lobe that affects you while the houses next door have no prob-

lems.
Several filters are available to Several filters are available to remove RFI and some require special installation (see Figure 5). The SNC Manufacturing Co. of Oshkosh, WI produces a model which plugs into the AC outlet (to pick up a ground only) and offers RJ11 jacks on the front for easy installation. It is called the RID (radio interference damper) and resembles a power transformer for a tape player or calculator. While the manufacturer will calculator. While the manufacturer will not allow total disclosure of the design, the filter is a tuned (precision wound) coil, low-pass L filter with sealed RF shield This device will solve most problems with RFI if the problem is not in the phone instrument.

SNC is also the leader in Power Line Harmonic noise mitigation products. Coil

mitigation products. C Sales & Mfg. of Rolling Meadows, IL also pro-duces a line of RFI fil-ters. These small, compact units are weather-resistant and one model is and one model is field-tunable.
Opto-Tech Industries of Ft.
Pierce, FL has a new line of filters available, offering modular design for easy installation.
These filters are potted into a small modular unit units a teck (o equipped with a jack/plug combination, and can be installed between the handset and telephone

All the filters listed above are effective at attenuating RFI signals. Proper installation is a trial and error process, beginning with installation at the NID. Severe condimay require several filters, located at each end of the IW, and also between the handset and telephone instrument. Filter prices range from a few dollars to about \$75.00 each.

dollars to about \$75.00 each.

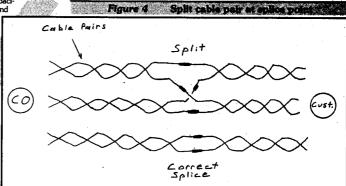
Symmetrical shunt filters can be installed by placing .01 uF capactors across the telephone line, and from each side of the line to ground. All components should be rated at 600 volts. LC filters are the most effective and must be custom-designed for each installation.

Avoid using RCL filters, as the resistance will add to the local loop and reduce operating current. Also, the pass band of the filter must be 20 Hz - 4,000 Hz, with a roll-off of no more than .5 dB across the band. The

filter must able

withstand potentials of 400 volts (90-130 VAC RMS = 255-368 VAC PP biased at -50 VDC), while passing (if series filter) 20-50 VDC @ 60 mA (see Figure 6). As you can see, we are asking a lot from

this filter.
Additionally, larger value capacitors add to the load imposed during ringing cycles, and may "look" like several additional ringers to the telco ringing circuit.





Home-brew circuits are fun to create and must also pass all criteria listed above

Once you have narrowed the trouble down to station wiring (IWs) or electronic telephones, it's time to begin experimenting with filter designs. Before launching into a full-blown engineering ses-sion, install RF beads at the NID and each jack location, forming at least two loops on the bead. RF beads are available at most electronics stores and you can pur-chase quantities at good prices from vendors in this magazine.

from vendors in this magazine. In some cases, no amount of fil-tering seems to alleviate the prob-lem. When this happens, you will likely discover RFI being detected by unshielded components on the telephone's printed circuit board, and there are no practical meth-ode for practica or the seems. ods for repair. Several of the com-mercial filters are designed for quick installation, allowing you to



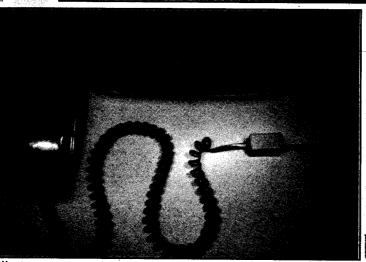
experiment with installation locations. Remember that factory-made filters have been lab tested for liability considerations. If the commercial filters (or home-brew) fall to correct the RFI for a single instrument, you will have to decide if replacement is worth the effort.

If RFI is due to station wiring (or some phones), the filters will eliminate the problem. However, some telephones will always accept RFI, regardless of any attempt to eliminate interfering signals. In this case, filters may only reduce the signals to a "low annoyance" level.

Replacing IWs with shielded wiring can be effective if the shield is grounded at both ends. While some would have you helieve this sets un a ground loop, you If RFI is due to station wiring (or

at both ends. While some would have you believe this sets up a ground loop, you can use the third member safety ground as a reference for the shield. This will also keep the shield from becoming a current carrying conductor. Grounding shields a single end allows the un-grounded and to be a different potential than other ground sources nearby, creating a safety hazard. In addition, ground all unitsed

may be a



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	on Tx freq.) across t
	n Ty fron Lacross t
While responsibility for RFI mitigation lies with the offended party (lust as twith RFI on televisions), radio operators can reduce the likelihood for interference. Often the antenna can be raised 10 feet, changing the "skirt" of the radiation pattern, so that nearby neighbors are not effected. This suggestion will probably invite letters, but it's true!  Many "snowbirds" spend winter months in Florida, installing temporary ham shacks in a spare room. These installations often lack proper electrical	rom each lead to greetion. Keep leads he radio case.  When installing to not rely on a single protection. Any mandectrode should be nethods (fall of pot letermine electrical grounds must be qualess to meet code require must be owner outlets are sooner meter. This are sooner meter. This are

installations often lack proper electrical design, and typically involve mobile units powered with 12 VDC power supplies. The antenna installation also leaves something to be desired, with the feed-tine run through a window and little consideration given to grounding systems. In this case, radios can leak RF into the power line, transmitting spurious radiation into surrounding homes.

Stand-alone power supplies can be isolated from ground, allowing the radio case to "float" above ground potential and presenting a safety hazard to the user. With the case ungrounded, there is an impedance between the case and ground, making the case an effective radiator. Installing a ground bus for the power supply, radio case, and antenna feedline will eliminate the safety hazard and reduce/eliminate RFI from radiation on the power line. This is important for frequencies below 100 MHz. Install. 001 uF capacitors (select broadgauge value base

he power leads and ound for added pro-short, and close to

a grounding system, is driven electrode for made ground (driven tested via approved tential, preferably) to worth. Man-made alified as 25 ohms or

driven elements on e bonded together if served by the same avoids serious safety hazards regarding difference of poten-tial between two independent grounding systems.

The ground rod at the power meter is connected to the power company MGN (multi-grounded neutral) and is the prime source for interconnection of all additional grounding systems. Use

Ing systems.

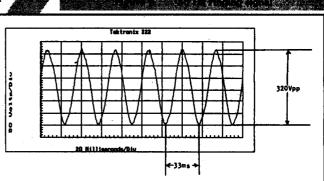
Use approved mechanical grounding connectors, such as compression fittings and bolt-on clamps when connecting ground conductors to rod. Avoid the temptation to solder the ground wire to the rod. While it may look great, power spikes and lightning strikes will weaken the connection and the connection will eventually become resistive. If you must solder, place

a clamp over the joint.

Be sure to bond across tower section joints to keep the tower from radiating (unless the tower IS the antennal). Ensure all rain gutter and downspouts are not equal

ter and downspouts are not equal to your Tx wavelength.

Next month, we will wrap-up this series by demonstrating a test set that actually measures noise signals and telephone operating parameters, and we will examine the last two noise types: EMI (electro-magnetic interference) and power line interference. NV



### Test Your "Arachnet" I.Q.

- . .

 $\square$  Switches 1,2,3,4 on ☐ Switch 3 on only

Are you an expert at networking Galaxies? Or are you still new to the whole process?

We've put together an informative little quiz for you to test yourself on the "ins" and "outs" of installing modems and chaining Galaxies together. Lets see how you do:

1. How many Galaxies can be networked together?  3  8  16  no limit
2. Which DIP switch needs to be turned on for an end game?  ☐ 1 ☐ 2 ☐ 3 ☐ 4
<ul> <li>3. Which test must ALWAYS be performed as the last thing when setting up or changing network?</li> <li>Transmit/Receive test</li> <li>Modem Configuration</li> <li>Arachnet Diagnostic Data</li> <li>Find a Free Node</li> </ul>
4. For a 2 game installation, what are the neccessary DIP switch settings for the game with the modem?  ☐ Switches 1,2,3 on ☐ Switches 1,2 on

5. For a 3 game installation, what are the neccessary DIP switch settings for the game with the modem if it is the middle game?  ☐ Switches 1,2,3 on ☐ Switches 1,2 on ☐ Switches 1,2,3,4 on ☐ Switch 3 on only
6. For a single game installation, what are the necessary DIP switch settings for the game?  Switches 1,2,3 on Switches 1,2 on Switches 1,2,3,4 on Switch 3 on only
7. What does the Transmit/ Receive test transmit?  League statistics  The alphabet  Diagnostic data Node locations
8. What baud rate(s) modems can be used with our system?  2400 only  9600 only  14000 switchable fax modem  Any modem that can automatically switch baud

ANSWERS: 1) 16 2) 3 3) Find a Free Node 4) Switches 1,2,3 on 5) Switches 1,2 on 6) Switches 1,2,3 on 7) The alphabet 8) 2400 only

rates

# The Archives: Service Information, Past and Present... for Galaxies and Older Dart Game Models



DARTMAN III...What's the SRC Field? (& other "Hidden" Features) Cont'd from page 1

#### The "Teams" Menu

Adding Byes and Divisions - Under "Division Setup" byes are inserted and divisions are set up. When a schedule is created, the addition of byes here will change the # teams under the League's setup area. as described previously.

SRC Field - This can be seen in "Browse Team Stats" and "Browse Player Stats" when viewing the weekly stats breakdown (F5). It is the last field displayed, and will have 2 letters in it. These letters tell how the particular line of data was entered:

NK - not known (such as existing data prior to an update)

UP - added manually using "Update Stats"

BR - added manually in "Browse Mode"

MC - manual modem collection as a "Collect"

MR - manual modem collection as a "Recollect"

AC - automatic modem collection

OF - operator card, first read

OR - operator card, read again

#### Under the "Players" menu, "Modify"

≤Shoots≥ - Clicking (or pressing Enter) on this word will cause
a screen to appear which shows all the players of a team and
their present shooting order. All players can be changed at
once in this screen, to whatever order is desired. This must be
done prior to making the Team card. (This number also shows
up as a reference in the first screen of "Browse Player Stats".)

#### The "Schedule" Menu

Board Usage - This handy report shows leagues that are played on boards at locations currently used in the league selected. Its a great tool when running multiple leagues at the same locations.

Free binders are available to keep Tech Tips issues together. Write or call us to request one.

#### "Sticky" Pigtails?

Over the past year, it has been brought to our attention that the "pigtails" on the switch matrix (the ribbon that connects to the Smart Target P. C. board) has in some instances separated itself, and the blue protective layer has pulled away and damaged the silver ink traces resulting in scoring problems. This seems to be happening only to the dark blue switch matrix made by Molex.

Cause - The problem seems to be isolated to certain switch matrixes from 2 different lots in 1994-95. The manufacturer has looked into why this problem has occurred, and believes that exposure of the matrixes to excessive heat was the cause. The pigtail is made of separate strips positioned on top of each other, with a blue protective layer between them. Due to heat, this layer became soft, causing the two strips to sick to each other. When the pigtails were flexed, the blue layer would tear away, causing the silver ink traces to be pulled and damaged.

Remedles - We have been inserting a paper separator between the two strips. If a switch matrix (with dark blue tails) does not have a paper separator, please insert one as a precaution. If you find that the strips are sticking and pulling the silver ink traces away, please contact Arachnid for replacement at no charge.

#### **Arachnid Monitors: Vertical Problems**

Arachnid has changed monitor manufacturers, and are going through a few "growing pains" with the new design. Apparently, certain internal components may not maintain their integrity after a period of time. This is being remedied by the manufacturer.

If your new monitors are exibiting a vertical problem, the vertical hold pot (in the back of the monitor) may be separating if it has been pushed or torqued in any way. If it has a wavy or jittery screen, try changing capacitors C410 and C413 (220uF, 25V). If these fixes don't solve the problem, contact Arachnid for repair or replacement, which in most cases will be done at no charge.

IN THE NEXT ISSUE OF ARACHNID TECH TIPS:

League Time Again! // Inside Wiring Maintenance Part 3 // Divisions and Handicapping // and Much More !!!



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