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WHY LMR CABLES?

by ROBERT PERELMAN

Many potential users of LMR cables hesitate to change away from the more traditional corrugated copper cables because they figure that "If it's not broke, don't fix it." They may know of the cost savings and performance improvements that can be achieved, but don't want to accept the risk of using something new. Of course, many people felt the same way about the electric lights, automobiles and airplanes when they were first introduced.

But the reality is, that the savings and improvements in system performance that result from switching are significant, as the many users of this innovative new cable have discovered. As the installed base of LMR cables grows and more satisfied users report excellent performance in their systems, there is less reason to stay with corrugated copper cables for base antenna feeder and jumper applications.

The users of LMR cables include such major OEM's as Motorola, Westinghouse, Hughes Network Systems, Qualcomm, Northern Telecom and Hewlett-Packard, as well as system operators such as AT&T Wireless, US West, Bell Atlantic Mobile and Nextel. Many smaller SMR and paging operators are making the switch, too. Installations have been in service for three years or more with excellent results and a high level of customer satisfaction. Types of systems using LMR cables range from 220 MHz SMR's, to cellular, 1500 MHz mobile satellite and 2500 MHz wireless LAN's and everything in-between.

The greater flexibility of LMR cable has made it the only choice in many applications. For example, LMR-600 is a 1/2" cable with the flexibility of 1/2" superflexible corrugated copper cable and loss approaching a 1/2" LDF cable. This has made it the only choice in applications requiring low loss and the ability to be readily routed within buildings. Its $1.25 per foot price and the availability of low cost, easy to attach connectors help to make it an attractive choice.

Larger LMR cables, such as LMR-1200 7/8" cable, provide the loss of corrugated copper cables of the same size, but that's where the similarity ends. LMR-1200 is virtually immune to kinking and can be bent on a much smaller radius than 7/8" corrugated copper cable. This allows easy routing through tight spaces in buildings and inside monopole towers. It can also be run on the inside of lattice towers, resulting in reduced windloading.

The new LMR-900 5/8" cable provides loss approaching a 7/8" cable, with flexibility better than a 1/2" LDF cable. Installations can readily be completed with no jumper cables, eliminating a source of loss and added cost. For runs up to about 150 feet the resulting loss is lower than for a 7/8" cable.

Times Microwave Systems stands fully behind the LMR product line. The quality and durability of this product allow us to offer the best warranty in the industry—5 years. We'll be happy to provide you with a copy.

For full information on the LMR product line call us at 800 TMS-COAX (867-2629) or send us a FAX at 203 949-8423.

LMR-600 JumpStart Program Status

by Joe Lanoue

An earlier newsletter described the LMR-600 JumpStart program which was initially launched on a limited basis back in early June. As a reference, I suggest you review the information in that article even though some of the information may be repeated below. The test results on the assemblies made by various Rep organizations are summarized below. These initial results clearly demonstrated some problems with our termination procedures and the crimp tool....." yes, the $300 crimp tool".

The good news is, we have modified the crimp dies and termination procedure and are prepared to "Re-Launch" the program nationwide with all rep organizations participating.

To recap briefly, the goal of this jumpstart program is to stimulate the sales of LMR-600, which is our equivalent to LDF4 1/2" corrugated copper cable. The 1/2" size cable is by far the highest volume cable being sold in the communications market today and yet we've had little success getting a reasonable share of it. The list price of LMR-600 is half that of LDF, the electrical performance is essentially equivalent, the bending/non-kink characteristic is far superior to LDF, and the connectors are much less expensive and much easier to install. **SO...WHY ISN'T IT SELLING?** We hope that by providing these samples and instructions, you will all become proficient at showing your customers just how "user-friendly" LMR-600 and it's accessories are. You will be able to do "dramatic" beginning-to-end jumper assembly fabrications right before their eyes in about 10 minutes. That's not 10 minutes a connector (like the other guys), but 10 minutes for the entire completed assembly. The result of all this will hopefully be substantially increased sales of LMR-600 cable and connectors.

We would like some feedback on whether your customers would prefer a 'clamp' style EZ-600 connector, as opposed to the crimp. The clamp style enables the connector to be installed with standard open end or adjustable wrenches, as opposed to the $300 crimp tool. Another solution to the possible $300 "impediment" would be to let the customer borrow the crimp tool we've furnished to you for this program. If there's only a few jumpers or feeders that need to be terminated it doesn't make sense for the customer to have to buy the tool. On the other hand, if his application will require many terminations, the $300 crimp tool will not be an obstacle.

An additional element that's been added to the package is the Cold Shrink® tubing for weather sealing the finished crimped termination. The heat shrink tube that comes with the connector is more suitable for cable termination in the 'controlled' factory shop environment than it is for field installation. We feel the Cold Shrink®, although somewhat more expensive than heat shrink, can be applied much more reliably and easily in the field and provide a far superior weather seal; as compared to a heat shrink that may inadvertently be installed "less than perfectly". This is kind of a test to see just how easy (or NOT) it is for you and presumably your customers to install.

At this point it might be good to review the results of the 'preliminary' Jumpstart program. The table of actual test results follows. *Sample "G" below represents what we would expect for typical performance in a well-made assembly.* Actual performance will vary "+/-" but statistically should be in this range. The other key observations that came out of the early round are: improper crimps, braid not trimmed, preventing crimp ring from seating against connector body, and broken crimp dies. As I said, we've modified the installation procedure and 'opened up' the crimp dies which hopefully solves the problems. Again.....the whole 'theme' here is **INEXPENSIVE-HIGH PERFORMANCE** plus **EASE OF INSTALLATION.**

Within the next few weeks you will receive the necessary tools and supplies to make six 6-foot assemblies or twelve 3-foot assemblies (your choice). The only tools you need to provide are: a good sharp hacksaw (with an "un-wobbly" blade) for making a perpendicular cut through the cable, a tape measure for measuring off the lengths of cable, a razor knife for any additional fine trimming required, a small pair of scissors, and a small file to de-bur the end of the center conductor. These are all items which should normally be included in any installers tool box. As a footnote, we will be supplying a set of replacement '600' dies for the crimp tool previously furnished. Please return the old dies to me.

One suggestion for dramatic demonstration purposes, is to make up the complete six-foot assemblies at your office. When making the sales call bring a six footer with you, cut the assembly in half right in front of the customer and reterminate the two free ends to create two complete 3-foot assemblies (including Cold Shrink®). Very impressive!

We plan to provide similar 'jumpstart' programs in the future as a supplement to our other training activities. If you have any suggestions for additional topics please let us know. Some of the items currently on the agenda include LMR-400 and LMR-900.

Good luck with the demos. If you have any questions or encounter any problems, call me at 203-949-8424.

LMR-600 JumpStart Results Summary

Sample ID	Made By	VSWR 900-1900 MHz	Loss 900 MHz	Length (inches)	Observations
A	MU	1.40	.09	18	Crimp Backwards; Connector Loose
B	MU	1.34	.07	18	Crimp Backwards
C	MU	1.34	.09	18	Crimp Backwards
D	BG	1.27	.07	18	Excess Braid not trimmed
E	BD	1.21	.04	18	Crimp Ring away from connector body
F	AB	1.16	.08	20	Excess Braid not trimmed
G	SW	1.15	.07	14	Crimp Ring away from connector body
H	JB	1.13	.08	14	Made in Bob's office
I	JP	1.12	.05	30	Made in TMS assembly shop
J	DM	1.20	.10	20	Heavy shrink boots installed
K	CG	1.20	.10	20	Heavy shrink boots installed
L	BJ	1.21	.06	14	Crimp "centered" on ring
M	NG	1.28	.22	74	Braid not trimmed; ring away from body
N	NG	1.28	.23	74	Braid not trimmed; ring away from body

LMR-240 + Reverse Polarity SMA's
for Wireless Datacom Applications

by Joe Lanoue

To address the needs of the **Wireless Datacom** market Times has recently announced the availability of **Reverse Polarity SMA** male connectors for **LMR-240**.

Wireless Datacom applications in essence extend local and wide area data communications coverage both within and outside of buildings. The system is typically a point-to-point **Spread Spectrum** radio link that carries the data without the need for the hardwiring of traditional network architecture. Just about any application requiring remote "wireless" data transport is a candidate for this technology.

FCC Part 15 regulations limit the Effective Radiated Power(ERP) of a **Wireless Datacom** system thereby limiting it's coverage to a relatively local area. These systems are typically used in the unlicensed portions of spectrum known as the **ISM** (industrial, scientific, medical) bands located at **902-928 MHz** and **2400-2500 MHz**.

The effective radiated power of these systems is controlled by the power output of the transmitter and the antenna gain. The antenna-transmitter combination is "qualified" through a process known as "type" approval by the FCC wherein the entire system, including the specific antenna and transmitter, is approved as a package. The output of the transmitter and the gain of the antenna must produce a certain maximum ERP.

Once the system has been approved by the FCC, there is a special "non-standard" connector interface used to control which antennas should be connected to the transmitter. One of the very common "special" interfaces is the **Reverse Polarity SMA**. The connector is a standard SMA except the male plug (ie.usually on the feeder cable) has a female center contact and the female jack (ie.usually on the antenna and transmitter) has a male center pin contact.

Typically the coax feeder used in these **Wireless Datacom** applications is "plain old" RG58 type which has very high attenuation loss at **ISM frequencies**.....typically 16.5 dB and 30 dB (per 100 feet) at 900 MHz and 2500 MHz respectively.

The substitution of **LMR-240** for the feeder reduces the cable loss substantially and thus enables **"extended"** coverage for the system. In comparison, **LMR-240** has attenuation loss of 7.6 dB and 12.9 dB (per 100 feet) at 900 MHz and 2500 MHz respectively. This is greater than **50% reduction** in signal loss compared to RG58 type cables, which is a BIG system performance enhancement.

Times has had **LMR-240** available for some time and is now pleased to announce the availability of these special **Reverse Polarity SMA** connectors for **LMR-240** from stock. The part number for the connector is **TC-240-SMRP** and has a list price of $10.00. We anticipate all of our distributors will be stocking these once the demand is generated. Currently we only plan to stock the **Reverse Polarity SMA** connectors for **LMR-240** but will consider them for other size cables depending on the demand.

If you need further information on **Wireless Datacom** applications and the **Reverse Polarity SMA** connectors for **LMR-240** please call Joe Lanoue at 203-949-8424.

Stripping Tool ST-1700C

by Joe Lanoue

Times has recently added the **ST-1700C** jacket stripping tool for the 1-1/4" **LMR-1700** cable. The tool works on the same simple principle as the other stripping tools. The cable is prepared for connector installation by flush cutting the cable end (perpendicular to the cable axis) and stripping back approximately 1/2" of the outer jacket. The **ST-1700C** performs the jacket removal step and eliminates the need for a sharp razor knife. The tool has two ends. One end is sized for a cable near the maximum diameter of 1.700" and the other, is sized for a cable closer to the nominal diameter of 1.670". The end that best matches the cable diameter, should be used.

The initial batch of tools shipped had a minor defect that is currently being modified. We expect to have quantities available for shipment by mid September. List price for the **ST-1700C** is $60.00 each. All of our distributors are encouraged to stock these tools to meet the expected demand.

Upcoming Events!

Microwave & RF Show
This October in England
with Castle Microwave
Booth # 703B

PCIA
September 21st - 23rd
Booth # 2028
Orlando, Florida

CMA Conference
November 9th -12th
Albuquerque, New Mexico

New EZ Connectors for LMR-900 and 1200

by Bob Perelman

A new series of lower cost and easier to install connectors is being introduced for the LMR-900 and 1200 cables. They will be available in male and female N, 7/16 DIN and 7/8" EIA flange styles. In order to make installation on the cable easier, instead of the self-tapping center conductor used on the current TC series connectors, the EZ series connectors use a spring-finger push-in pin. The ST-900/1200-C stripping tool can be used to strip the cable jacket back to the proper dimension to attach these connectors. Attachment of these connectors to the cable can easily be accomplished in less than 5 minutes.

Unlike the TC series connectors, these connectors are plated. All parts in the RF path are silver plated and all mechanical parts, such as the coupling nuts and clamp rings are nickel plated. The insulators are captivated on the center pins, so there are no small parts to lose.

The electrical performance of these connectors is also very good, with VSWR on the EZ-900-716MC measuring better than 1.10 up to 2 GHz on a 1 foot assembly terminated with two of these connectors. Other connectors in this series have similar performance.

The other major advantage that these connectors offer is lower price. It is expected that over time, as these connectors all become available, the old TC series connectors will become obsolete. Pricing, part numbers and availability are indicated in the table below:

Part Number	Description	Price	Availability
EZ-900-716MC	7/16 DIN Plug for LMR-900	$65	September
EZ-900-716FC	7/16 DIN Jack for LMR-900	70	October
EZ-900-NMC	N-plug for LMR-900	45	In-stock
EZ-900-NFC	N-jack for LMR-900	45	In-stock
EZ-1200-716MC	7/16 DIN Plug for LMR-1200	65	October
EZ-1200-716FC	7/16 DIN Jack for LMR-1200	65	October
EZ-1200-NMC	N-plug for LMR-1200	75	In-stock
EZ-1200-NFC	N-jack for LMR-1200	80	In-stock
EZ-900-78EIA	7/8" EIA Flange for LMR-900	86.10	October
EZ-1200-78EIA	7/8" EIA Flange for LMR-1200	103.50	October

"New" 7/16 DIN Connectors

by Bob Perelman

Times Microwave Systems announces the availability of a new 7/16 DIN plug connector for LMR-900, the EZ-900-716MC. It's easy to install and provides excellent electrical performance. The center conductor is captivated to assure proper pin depth. The design includes integral O-ring weather sealing. All portions of the connector in the RF path are silver plated to provide the lowest levels of passive intermodulation (PIM). The precisely designed matching section of the connector provides better than 1.1 to 1 VSWR up to 2 GHz.

Installation is simplified by the availability of a stripping tool, the ST-900/1200C and the unique center conductor design. The stripping tool strips the jacket off the cable to the correct dimension in seconds. The laborious task of tapping the center pin of the connector into the center conductor of the cable is eliminated by the use of a push-in center contact. Reliable contact to the center conductor is made by silver plated spring-fingers.

Price of the EZ-900-716MC is $65 each and it is available from stock. Other connectors in this series include N-males and females and 7/16 DIN females for both LMR-900 and LMR-1200.

Plenum Cable Update

by Tony Fedor

Our early attempts to qualify a low-loss TFE taped core LMR construction for U.L. plenum approval have failed. The two constructions, a taped PTFE LMR-200, and a taped PTFE LMR-600, both failed the severe UL910 Steinner Tunnel Test. There are some unanswered questions as to what caused the cable to fail the smoke and flame requirements. A sample of just the core material (taped PTFE), will be resubmitted. If the cable core passes the UL910 test, we will then determine what the outer jacket material will be, and will then resubmit a construction for plenum approval.

Did You Know ???

In the month of August, we advertised in all of the following:

Cellular & Mobile International
Wireless Product News
Cellular Integration
Microwave Product Digest

As a result of Assembly requirements, we will now be offering the following "New" connectors:

Rt. Angle N-Male for LMR-400
EZ style TNC Male crimp for LMR-600
TNC crimp for LMR-240
Crimp N-Female bulkheads for LMR-600
N-Male Rt. Angle for LMR-600
SMA Rt. Angle for LMR-240

Watch for additional information to come!

CMA - Around the Corner

Well, it's time to start planning for CMA in Albuquerque. To make this a highly productive event for Times and it's Reps, we will need your input on topics and issues that you would like to have covered. Current topics we are considering are:

1) New products- i.e. 7/16 DIN connectors
2) Handling objections- i.e. shielding and intermod
3) Market focus - where should you be concentrating your efforts?
4) SPIF Programs- i.e. LMR sales contest
5) Workshop- i.e. 20 min. hands on termination of LMR cables
6) Rep success stories- to be given by the Reps themselves
7) Private sessions to discuss territory strategies with each Rep.
8) Open forum- i.e. Rep support from factory and distributors.

On the **FAX-BACK** form below, **(Fax: 203-949-8423)** list the topics you are interested in as well as topics and issues not listed.

REP FIRM_____

WILL YOU BE ATTENDING CMA? YES NO

HOW MANY FROM YOUR FIRM WILL ATTEND THE TIMES SESSION _____

DAYS AND TIMES AVAILABLE FOR PRIVATE SESSIONS _____

CIRCLED ARE TOPICS NUMBERS I WOULD LIKE COVERED: 1 2 3 4 5 6 7 8

LISTED BELOW ARE TOPICS AND ISSUES I WOULD LIKE TO SEE COVERED:

_____

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$ 1.3 Million worth of Times Cable in London Underground

by Billy McGill

In the last 18 months we have picked up on a real niche market for LMR cable. We discovered that London Underground (the world's largest and oldest metro system) was about to invest very significantly in new radio based communications and signalling technology for two of the 13 lines which make up the London Underground - the Jubilee and Northern Lines.

Adittionally, due to the Kings Cross Station Fire in Central London in the late eighties, London Underground (L.U.L.) had acknowledged the criticality of having all materials used in the subway to be of the Low Smoke/Low Toxicity/ Zero Halogen types. Therefore there was a new requirement for a complete range of Low Loss coaxial cable assemblies which could meet the new L.U.L. Low Smoke/Low Toxicity/Zero Halogen requirements.

L.U.L. had several very large suppliers of low technology coaxial cable types but none of them had any real expertise in RF and Microwave Low Loss Coaxial Cable Types.

To gain L.U.L. approvals, we have had to invest in having our LMR-FR cable types independently tested to demonstrate that we meet the very stringent London Underground Code of Practise specifications for Low Smoke/Low Toxicity/Zero Halogen performance.

We successfully completed qualification for cable sizes LMR-200 - LMR-1200. In the last few months, we have gained contracts for LMR cable worth some $330,000+ for the following applications:

Station Platform to Train Live CCTV
Automatic Radio Control of Driverless Train
Concealed onboard Train CCTV Passenger Security System
Radio controlled Train Door opening and closing system
Station Platform CCTV cabling
Station - Train - Station Radio Communications

Additionally, we recently were awarded a $1 Million contract to provide the entire Jubilee Line (330,000 Feet) Leaky Feeder ("NU-TRAC" Radiating Cable) system which enables Radio Communications to work within the tunnels and station platforms.

Don't forget we have this unique/high volume product too! If anyone wants further information, I can be contacted on (UK) 44 1592 655428 or Fax me on (UK) 44 1592 653162.