

Optical fibre transmitter & receiver FOXCOM Series 105

TEST REPORT

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1.0 Introduction

With reference to Price Enquiry DO-15469 and Order CA 1085558, batch 1 (1 transmitter and 1 receiver) was tested for compliance with the required technical specifications.

2.0 Transmitter

The 1.6 V factory preset input trigger level is correct. However, the input impedance has been fixed at 50 Ω , and we would like to have the original standard option of 50 Ω or 1 K Ω , selectable with JP3.

Using the faxed update of the operating manual, the modulation depth was increased to obtain the maximum optical power coupled in a 50/125 micron fibre. Only -20 dBm was obtained at 1310 nm, instead of the -16 dBm required in the technical specification. However, this should not be problem as long as the 14 dB working range required in the specification can be achieved (see section 4), i.e. in this case the receiver must operate correctly at an input power of -34 dBm.

The front panel is rather loosely attached. We suggest adding 2 extra screws.

3.0 Receiver

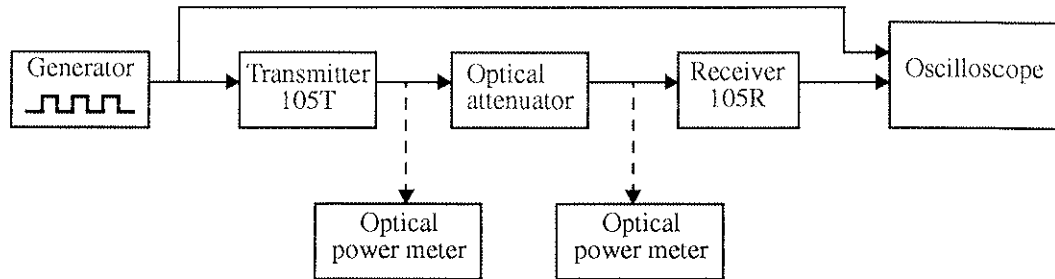
Because the output buffer is not a TTL level 50 Ω driver, as required in the technical specification, the output pulse is distorted and the high level is only 1.8 V with a 50 Ω load, instead of 2.4 V. The output transition time is < 10 ns, as required.

There is no indicator LED on the front panel, as required in the technical specification, to indicate correct data reception.

The gain adjustment with the front panel potentiometer is very difficult to tune (i.e. the output is stable over a very narrow range of adjustment) and we would like to know the exact procedure to be followed to obtain trouble-free operation over an extended

period of time (most of the receivers will be inaccessible in the LEP tunnel for months at a time).

4.0 Tests in the laboratory



Instruments :

Function Generator : Rhode & Schwartz AGFU 1..20 MHz.
 Optical attenuator : Photodyne 1950XR 5..60 dB @ 1310 nm.
 Digital oscilloscope : Lecroy 9354 500 MHz, 500 Msamples/s.
 Optical power meter : Wandel & Golterman model OLP-10.

Input signal :

Square wave : 0..4 V / 50 Ω
 Frequency : 5 MHz.
 Duty cycle : 50 / 50.
 Rise/fall time : < 10 ns.

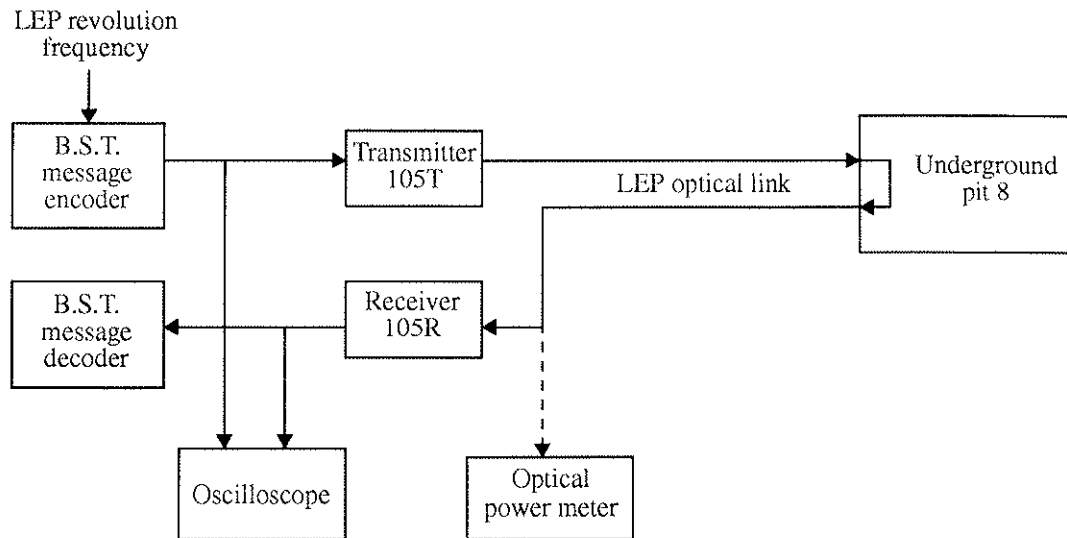
Measurements obtained :

Optical attenuation (dB)	Input optical power (dBm)	Gain adjustment	Output OK ?	Signal jitter (ns)
0	-20	Minimum	Yes	1.2
5	-25	Yes	Yes	1.3
8	-28	Yes	Yes	1.8
10	-30	Yes	Yes	2.3
11	-31	Yes	Yes	2.7
12	-32	Yes	Yes	3.3
13	-33	Yes	Yes	4.3
14	-34	Yes	Yes	5.8
15	-35	Maximum	Yes	7.7
16	-36	Maximum	No	--

Conclusion :

The link works in a range of 15 dB with a jitter < 10 ns, in compliance with the required specifications.

5.0 Test in LEP collider



Every LEP revolution (89 μ s), a B.S.T. message is sent to the Transmitter and checked at the Receiver output. The B.S.T. message is Manchester encoded at 2.048 Mbit/s. The optical link from the LEP Control Room to the Underground pit is a bidirectional multimode 50/125 micron optical fibre. The full transmission distance of 10.4 Km corresponds to the longest single path (10 Km) to be handled in the final installation.

The measured optical power at the Receiver input was -33.7 dBm. After adjustment of the receiver gain control, the B.S.T. message decoder did not detect any error during a period of 48 hours and the jitter did not exceed 8 ns.

6.0 Conclusions

Batch 1 of the order is considered a good basis for launching the production of batch 2 (50 pairs) with the following provisos :

- a buffer and 50 Ω driver should be incorporated in the Receiver circuit and a data indicator LED added to the front panel, as indicated in the fax of 22nd January 1996 from H. Loboda of Lightworks to J.J. Savioz .
- the 2 prototype modules of batch 1 will be returned to bring them to the same level as the batch 2 modules (i.e. in conformance with the technical specifications).
- in view of the difficulty of tuning correctly the Receiver gain, a link adjustment procedure should be provided together with the calibration data for each Transmitter and Receiver (including for example the optical power output available from each Transmitter and the range of input optical power within which each Receiver operates correctly). The batch 1 pair satisfied the 14 dB operating range requirement, but it is very important that all the batch 2 pairs do so also.
- we accept the modification to the delivery schedule proposed in the fax of 30th January 1996 from H. Loboda to P. Ribeiro (i.e. the original delivery date of 24th March 1996 is extended by one day for each day that passes after 30th January 1996 before Lightworks receives the present acceptance).