

OS2030Ud.doc  
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PRODUCT LL2030

G703 Protocol to Fibre Optic Converter.

USER MANUAL

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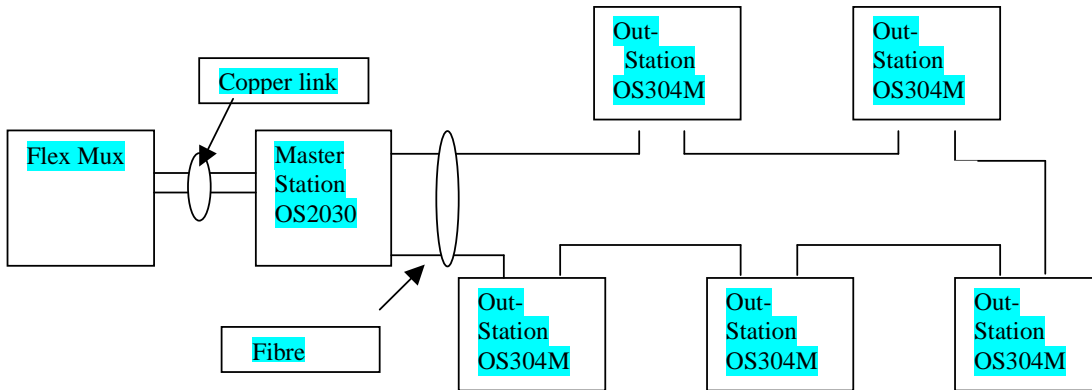
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## PRODUCT DESCRIPTION

### GENERAL

The LL2030 system is designed to transmit a 2 Mbps CCITT G703 data link over fibre. The unit is especially designed to interface between G704 CAS protocol and several OS304MUX units. This allows the drop and insert of speech channels. The OS304MUX units can drive either a 2 wire or a 4 wire audio circuit.

The system operates over a single Fibre ring. The optical interface can be interchanged to suit the application.



The unit has a management system built in which offers intelligent alarm monitor system and provides for configuration of the system. This makes the localising of fault conditions easy. Local and remote loop back facilities are included to provide additional test facilities. The Management system sends messages to and from one unit to the other by utilising a specially developed technique of combining the G703 data channel with these messages and transmitting it over the fibre. All alarm and status conditions are relayed from one unit to the other in this way.

The front panel is equipped with a LCD readout and can display various alarm messages and system operational functions. This gives the technician an instant overview of the systems status and fault conditions.

Local and remote loop back is selected by a dip switch on the front panel. Local loop back will route the data received by the unit at the 'traffic in' port through the decoder and directly encode it again and transmit it back to the 'traffic out' port. No jitter removing is introduced. Remote loop back will route the data received at the 'traffic in' port through the optics to the remote units where it is again routed straight back to the local unit and transmitted back to the 'traffic out' port. This function allows performance testing of the whole system without interference of the individual channels.

The unit is modular in design and can thus be upgraded with different optics or power supply. The distance over which the system can operate is determined by the fibre interface used. The options are limited to 3, 12, 16, 24, 36, 50 and 70 Kilometres. The power supply can be replaced by removing the power supply module and fitting the required module. Either 220VAC, 110VAC or 48VDC. Other voltages can be supplied on request.

The system uses the latest technology in line driving and decoding integrated circuits and therefore fully comply with the stringent CCITT standards.

The unit is housed in a small metal enclosure. The unit is compact and can fit two aside in a 19" rack with a height of 2U.

## OPTIC INTERFACE.

### Option Module 'OPTIC1CC'

The Optic interface operates on single mode fibre. 9/125Micron.

The connector type is FCPC.

The transmit launch level will be better than – 10 dB. Measured at the end of a 1 meter patch cord.

The receive sensitivity must be better than – 30 dB. At a bit error rate better than 10<sup>-12</sup>.

## ALARMS AND INDICATIONS

The unit has a voltage free alarm output contact which will activate when part of the link should fail. The alarms are split up into three sections PCM side, Optic side and remote status indication. This is clearly indicated on the front panel of the equipment. All alarm indications are generated locally by the unit itself. Remote alarms generated by the remote units are relayed to the local unit via the optic link. This follows that no remote alarms and indications are possible when the optic link is broken. In the event of the link failure the remote indications will indicate which outstations have failed and which ones are still communicating. Thus it is easy to ascertain where the link is broken.

As an option the outstation alarms can be extended via the RS232 link to a contact echo alarm box. This box will provide a voltage free contact for every outstation and should a fault occur at the outstation the box will indicate an alarm on a led and operate a voltage free contact.

### LOCAL ALARMS.

#### 'PCM SIDE'

##### 'Lock'

This signal indicates that incoming PCM signal is present and a valid frame structure is recognised.

##### 'NoSig'

This signal indicates that there is a break in the PCM signal received. I.e. there is no signal on the PCM input.

##### 'AIS'

The AIS received alarm indicates that the received signal has the alarm signal set.

##### 'Busy'

This indication is activated when the Processor is busy updating the outstations.

#### 'OPTIC SIDE'

##### 'Lock'

This signal indicates that the optic is receiving valid data.

##### 'Nosig'

This signal indicates that the received optic level is too low or the fibre is broken.

##### 'Link Loss'

This signal indicates that the optic ring is broken.

##### 'Term'

This signal indicates that the management system is connected and data is transferred.

#### 'REMOTE Status'

The remote status indications show the polling of the outstations. Each the outstation is polled the corresponding Led will light up and as a response is received the Led will switch off. If no response is received then the indication for that outstation will remain on. If the optic ring is broken then the link fail led will light up. The outstation at which the link is broken on it's receive side will generate a PCM frame and send it to the master. At the master the corresponding led will extinguish. This will indicate the position of the break in the optic link.

## DIP SWITCH SETTINGS.

### 'OPTIC Loop'

If this function is selected the optic receive signal is repeated directly to the optic transmit signal.

**'PCM LOOP'**

Will route the data received by the unit at the 'traffic in' port through the decoder and directly encode it again and transmit it back to the 'traffic out' port. No jitter removing is introduced.

**'REMOTE LOOP'**

Remote loop will route the data received at the 'traffic in' port through the optics to the remote units where it is again routed straight back to the local unit and transmitted back to the 'traffic out' port.

**'FUNCTION'**

This switch selects a debug function not suitable for user use.

**'DISPLAY'**

By pressing the up or down key the display will indicate Status and Alarms with an asterisk next to one of the two. The up down arrow keys will select between Status and Alarms. Once the choice is made the right arrow key will select the function. Now the up down arrow keys will select the stored alarms or in the case of the status it will select the outstation required.

In this mode the Status indications will indicate the 4 line signalling conditions. I.e. ring and loop indications for each line.

The format for alarm indication is: Record number, Date and time, Outstation number, Description. Note master station is indicated by '0' as the outstation number.

**OTHER FEATURES****Signal loss:**

Should the traffic in signal fail the equipment will automatically send an alarm signal to the remote sites and the data speed will be at the centre Frequency.

Should the optic signal fail or be corrupted the output of the unit at the Traffic out socket will send an alarm signal and the data speed will be at the centre frequency.

**MANAGEMENT FACILITIES**

The unit is equipped with a RS232 connector which enables the unit to be managed. A dedicated software package that runs under windows allows several functions of the unit and the outstations to be controlled. It is necessary to configure the system before it can be operated. Special configuration facilities can be accessed using the software package on a portable computer.

The software allows the following facilities.

**Uploading and Downloading of software.**

Should it be required new software for the master unit and the slave units can be downloaded to the master unit.

The user can choose which software or whether it is the outstation or master unit that must be downloaded.

Once downloaded the master unit must be reset for the software to be active.

**Setting up of channel configurations.**

The software also allows setting up of line configurations and gain adjustments for each time slot. Once the alterations are done it must be downloaded. The alterations will take effect after a short delay. A Backup copy of the configuration for a particular system can be stored on the system disk. The unit will be able to allocate timeslots to users as per selection from the management system. Each time a change is made to the time slot allocation an event will be recorded in the alarm record.

Time slot allocation will be housed in a file in the intelligent unit.

The file will have the following format:(Time Slot)(2), (Telkom Number)(7), (Outstation Nbr)(2), (Line number)(1),(configuration)(1,1,1,1,1),(Reference)(30), (Date, Time Modified)(15), (Action)(30). ASCII data.Sample:15,4761753,03,4,2,0,0,0,0,0,Jakals Fontein,1999-11-04, 13h45,Time slot allocation.

#### Alarm monitoring.

A copy of all recent alarms conditions can be requested from the unit. This can then be printed or viewed for further notice.

The unit will store all alarms both local and remote. The alarms will be tagged as urgent or non-urgent. Date and time of occurrence will be recorded.

A maximum of 100 alarms will be recorded.

The alarm format will be:

Record(3), (Date and Time)(16), (Address)(2), (Description)(20)  
Sample. 047            2/4 11:12            0            LINKLOSS

It is possible for the intelligent unit to pass on a software upgrade to the outstations.

## SYSTEM DESCRIPTION

### Master Station

The master station receives the PCM frame from the host equipment. It will lock onto the frame received. I will then decipher the signalling protocol. This protocol is then converted to the protocol of the multi drop system. The data is then CMI encoded and sent out over the fibre. The PCM frame is fed to all out stations in a Fibre ring network. The outstations will then drop and insert channels as programmed. At the master the multi drop protocol is again converted back into the host signalling protocol.

### Outstation.

The outstation comprises of a clock recovery circuit and a framer.

The framer will take the received data and re-time the data for transmission further down the line. Whenever a timeslot allocated to a particular outstation is reached, the time slot will be dropped off to the correct line interface and the interface data is then inserted in the frame.

Time slot 31 will be used for all communication with the master unit.

### Line interface.

The line interface will consist of a CODEC that is programmed by the intelligent unit.

The CODEC will be programmable and will control the following.

Transmit gain adjustable over a 10dB scale in steps of 0,1dB.

Receive gain adjustable over a 10dB scale in steps of 0,1dB.

Adjustable Hybrid balance registers.

A Dip switch setting will identify the location of the regenerator.

## PREPARATION FOR USE

### UNPACKING

Check for physical damage caused during transport. Return any damaged equipment.

### INSTALLATION

Check the Voltage supply rating of the equipment before installation commences.

Ensure that the link loss over the fibre cable is within the power budget of the equipment. See the model number and optic option.

When installing the unit in a 19" rack the feet of the unit must be removed in order for it to fit in a 1U high space. a Shelf is supplied as a separate item, which supports two units next to each other.

Connect the chassis earth leads to the shelf. Connect the common earth to the shelf.

Secure the unit by installing the 'screw on bracket' at the rear of the unit.

Connect the data and optic cables. Note the data and Optic directions. The Optic link must be connected local transmit to remote receive and visa versa.

The data connections for traffic in and traffic out are situated on the BNC connectors at the rear of the unit. These connections are 75 ohm and can be grounded on the sheath side by installing links LK1 and LK2 on the PCB inside the box.

To configure the unit for 75 ohm the following links must be made:

- Install link J1
- Install link J2
- Install link J6

For 120 ohm termination a female Phoenix Connector is provided. The connections are:

TRAFFIC OUT	Pin 1 & 2
GROUND	Pin 3
TRAFFIC IN	Pin 4 & 5

To configure the unit for 120 ohm the following links must be made.

- Remove link J1
- Remove link J2
- Remove link J6

If the alarm extension is required then connect the extension wire to the voltage free alarm contacts at the back of the unit.

Connect the power cable.

Should the unit operate on DC power then the D.C. power connections are shown on the rear panel.

The equipment has no on/off switch thus it will be active as soon as the power is connected.

### COMMISSIONING

At switch on the unit will flash the busy led until all software is verified and loaded.  
If the link is correctly connected then all alarms will extinguish.  
The PCM SIDE 'Lock' and OPTIC SIDE 'Lock' indications will light up.  
The unit will then start stepping through the outstation polling leds.  
The LCD display will show the Date and Time and software version number.  
Should you experience problems follow the first line maintenance procedure chapter 5.0.

## OPERATORS INSTRUCTIONS

The unit need no operator intervention to function, however when a fault arises, it is necessary to observe the alarm indications and to perform tests such as local and remote loop back.

See maintenance instructions for any other functions.

## MAINTENANCE INSTRUCTIONS

### INSTRUMENTS AND TOOLS REQUIRED

- 2Mbps G703 data test set.
- Multimeter
- Optic power meter

## FIRST LINE MAINTENANCE

When arriving at a suspect link it is necessary to note the alarm condition of the equipment.

First observe the power indication. If the power indicator is off then check the power supply. The AC unit has a fuse inside the connector at the rear and an additional fuse inside the unit. The DC unit has a fuse inside the unit. If necessary replace it with the correct value fuse.

Next observe the alarm conditions.

### PCM SIDE

'NoSig' will indicate the loss of received data on PCM side. Check your data source. Make sure that the connections are correct transmit to receive and receive to transmit. Make sure that the correct impedance has been selected.

#### 'Lock'

If the 'NoSig' led is extinguished but the 'Lock' led fail to operate then the frame format for the unit is incorrect. Set up the signal source correctly.

#### 'Busy'

If the 'Busy' led remains on or flashes then the software is corrupted and must be reloaded using a Laptop with the correct software and parameters.

#### 'AIS'

The 'AIS' led indicates that there is an alarm condition in the source signal and this must be repaired at the source signal.

### OPTIC SIDE

'NoSig' will indicate the loss of received optic data. This usually indicates a fibre break and no further alarms can be sensed. Check you fibre cable connections for breakages. Replace the patch lead.

**'Lock'**

If the 'NoSig' led is extinguished but the 'Lock' led fail to operate then the data received from the optic fibre is corrupted. Possible causes are too high loss on the fibre loop or even overdriving of the optic receiver. Measure the optic receive power and check if it is within the limits specified for the optic module.

**'Link Loss'**

If the 'Link Loss' led remains on or flashes then there is a break in the fibre loop. Verify which remote outstation leds are permanently on and which are flashing. The fibre break will then be between the last on permanently on and the first one flashing. Check the installation diagram of the system to ascertain the exact position of the break.

**'Term'**

This signal should only light up when the management system is connected. It indicates only that the terminal is active and has no influence on the system performance.

Lastly Check if any of the Dip switches are in an on position as this will disable the system.

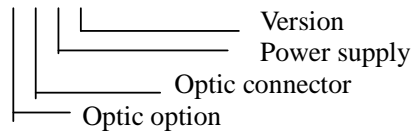
In order to test the link. Connect a G703 data test set to the local unit. Should a problem be experienced select local loop back on the dip switches on the front panel of the equipment. The traffic in fail alarm must be extinguished. Data must be received by the data tester. This will test the data receive ,decode, encode and transmit signals of the local unit. To test the next stage of the link deselect local loopback and select remote loopback. This will now test the local unit completely and will also test the optic interface to the remote unit. If the unit passes this test then it can safely be assumed that the optic link is in order. With both local and remote loopback deselected the link should operate. If the test is successful then the link is considered operational.

## Stock Codes

## SPARE PART CODES

Define stock code and add spare part code in second character position.

OX2030XXXX



Spare Part Code see table below.

## SPARE PART OPTION

SparePart Code	Description
A	METAL BOX COMPLETE
B	PROCESSOR CARD
C	POWER SUPPLY CARD
D	OPTIC CARD
E	DISPLAY CARD
F	POWER CABLE

## PHYSICAL AND ELECTRICAL SPECIFICATION

## ELECTRICAL

## Power supply:

115/230VAC 50/60Hz. 5Watt.  
-48VDC. 5Watt.

## Data standard options:

Bell DS-1. 1,544 Mbps.  
CCITT G703. 2,048 Mbps.

## Data coding:

AMI/B8ZS/HDB3.

## Impedance:

75/120ohms unbalanced for SEPT  
Frequency variation > 75 ppm.  
Jitter tolerance. > CCITT recommendation G823 table 2/G823.  
Jitter transfer. > CCITT recommendation G742.

## Connection:

5 Pin Phoenix Connector for 120 Ohm.  
Traffic In 1 & 2, Gnd 3, Traffic Out 4 & 5.  
Two BNC connectors for SEPT 75 Ohm.  
Maximum distance to user equipment:  
200Meters.

## OPTICAL

## Connectors:

FCPC Multimode/Singlemode

## Fibre Compatibility

Multi-mode 50/125 micron.  
Single-mode 9/125 micron.

## FUNCTIONS

## Indicators.

Power,  
PCM SIDE  
Lock, Nosig, Busy, AIS,

## OPTIC SIDE

Lock, NoSig, Term, Link Loss

## REMOTE STATUS INDICATION

1 to 8 Line condition indications.

## Alarm Output.

Voltage free alarm output contact.

## PHYSICAL

Depth: 180mm Height: 42mm  
Width: 202mm Weight: 1.5Kg

## ENVIRONMENTAL CONDITIONS

Temperature: -5°C to +45°C  
Humidity: 0-95% non-condensing.

ANNEXURE A1	GRAPHIC ILLUSTRATION OF DATA FLOW.
ANNEXURE A2	FRONT PANEL.
ANNEXURE A3	REAR PANEL.

