CDPD Solutions From CML

Cellular Digital Packet Data (CDPD) is a packet data transfer system currently employed to provide a digital data facility to run in parallel with the existing analogue AMPS cellular radiophone system using current frequencies and RF infrastructure.

Reusing AMPS infrastructure provides the CDPD system and therefore its participants with the same, wide geographical coverage as the cellphone voice network. CDPD supports such common protocols as TCP/IP and OSI/CLNP.

CDPD based digital communications is becoming increasingly popular for such varied applications as: 'The Mobile Office' (providing voice, Fax and data comms), Stock Control, Reporting and Audit, 'Swipe' Terminals, Telemetry, Fleet Control, Taxi and Courier Services, Electronic-Mail, Database Access, Hand-Held and Laptop Communications and Emergency and Security Services.

Equipments developed so far include: Cellular Telephones with integral Data Terminals, Stand-Alone Data Terminal Accessories, Personal Digital Assistants (PDA) and PCMCIA Radio Modem Cards for PCs and Laptops and Custom Radio Modems.

Consumer Microcircuits Limited offers microcircuits that can offer vesatility, high performance and high savings in many CDPD peripherals.

Base Station or Mobile End Station (MES) Design Example

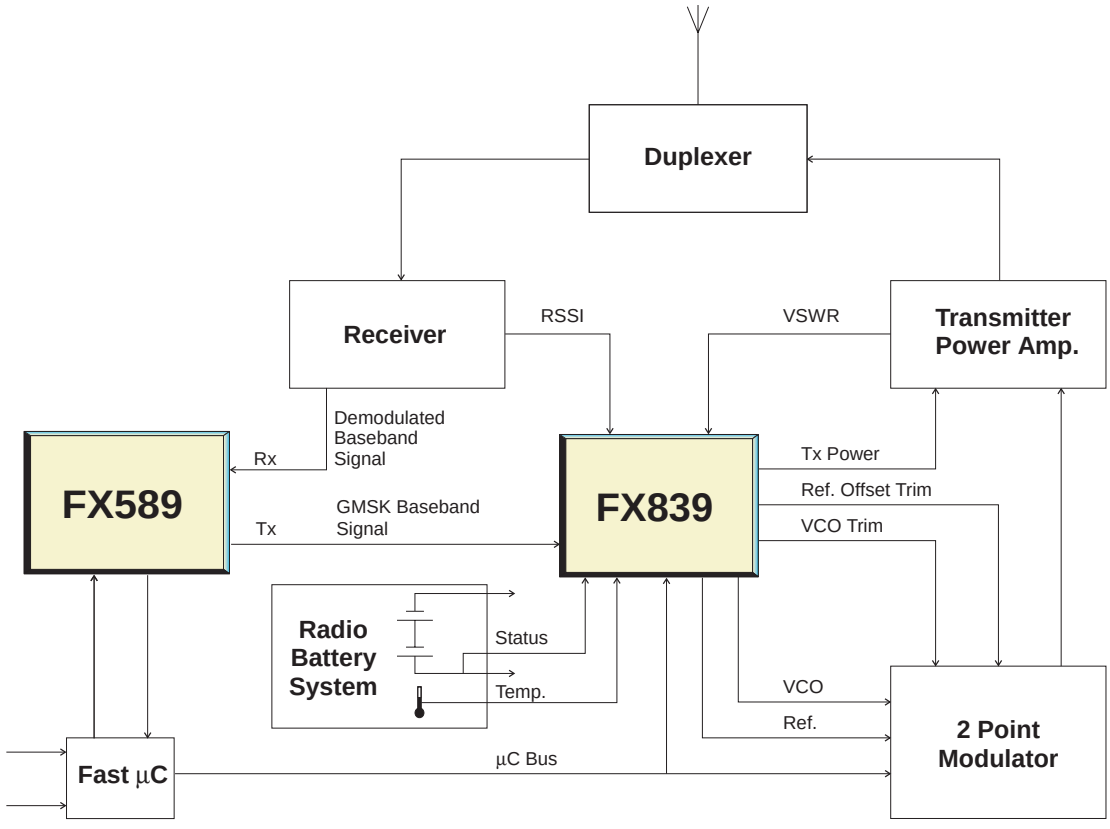

Fig.1 CDPD Example using the FX589 and the FX839

Base Station or Mobile End Station (MES) Design Example ..... (see Figures 1 and 2)

At the core of this CDPD equipment design is the *FX839 Analogue Control Interface*. Dual software adjustable amplifiers drive a VCO based 2-point modulation system in the RF transmitter. These amplifiers are also used for system deviation control.

The built in digital-to-analogue converters (DACs) on the *FX839* can be used to adjust other points in the transmitter circuits. For example, Tx power, power-ramping and trimming of VCO and reference oscillators can be controlled with 10 bit resolution.

Additionally, the 4 input analogue-to-digital converters (ADCs) can monitor analogue signals such as, battery voltage, temperature and received signal strength for example.

A unique feature of the *FX839* is the provision of dual threshold limits for each ADC input. These allow the controlling µC to set limits on a value at a particular level and then enter a sleep mode. When one of the limits (upper or lower) is exceeded by the analogue input signal, the *FX839* generates an IRQ to wake the host µC. This could for example, be used to allow a µC to sleep until an RF carrier of sufficient level arrives on the channel.

The 2-point modulation driver amplifiers are fed from the *FX589 GMSK Modem Data Pump*. Analogue signals from the receiver discriminator are processed by the *FX589* to recover data bits and an accurately timed data clock.
The *FX589* has a high tolerance to frequency offsets as it includes an automatic offset compensation in addition to an anti-fading 'hold' mechanism. The fast synchronous data interface from the *FX589* to the host µC allows implementation of the CDPD protocol (MES or Base Station) in the host controller and enables the controller to obtain signal-to-noise estimate information from the *FX589*.

Circuit Diagram:

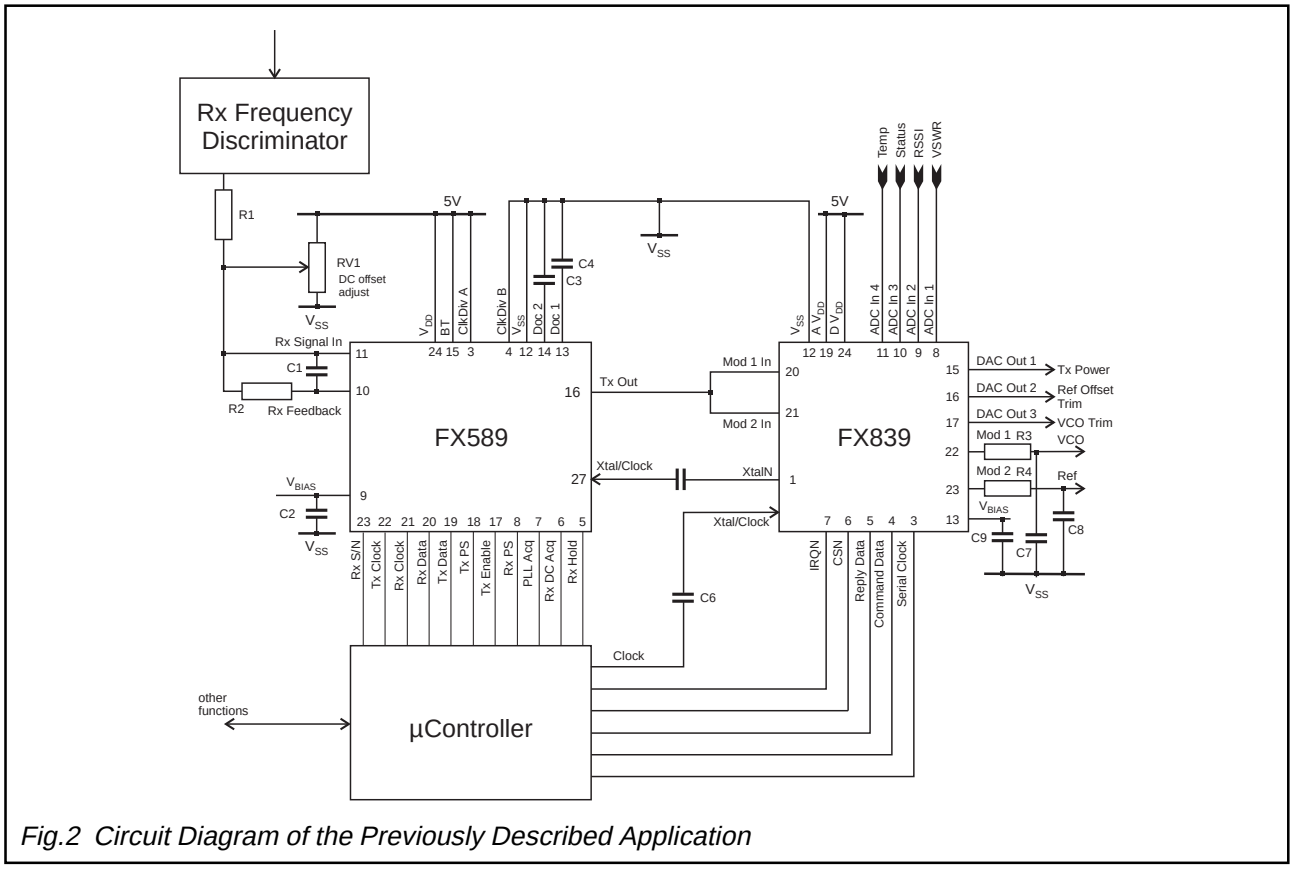

Fig.2 Circuit Diagram of the Previously Described Application

Component	Value	Tol/Remarks
R1	note 1	±10%
R2	100kΩ	±10%
R3	91kΩ	±1%
R4	91kΩ	±1%
RV1	note 2	
C1	22pF	±20%
C2	1.0µF	±20%
C3	6.0nF	
C4	6.0nF	±20%
C5	10pF	
C6	10pF	
C7	120pF	±5%
C8	120pF	±5%
C9	1.0µF	±10%

Operating Conditions

BT = 0.5 Bit Rate = 19200

V_{DD} = 5.0V

Notes

1. Adjust gain for Rx Input signal.
2. Signal and dc level adjustment.

Mobile End Station (MES) Design Example
- Optimised for low power operation

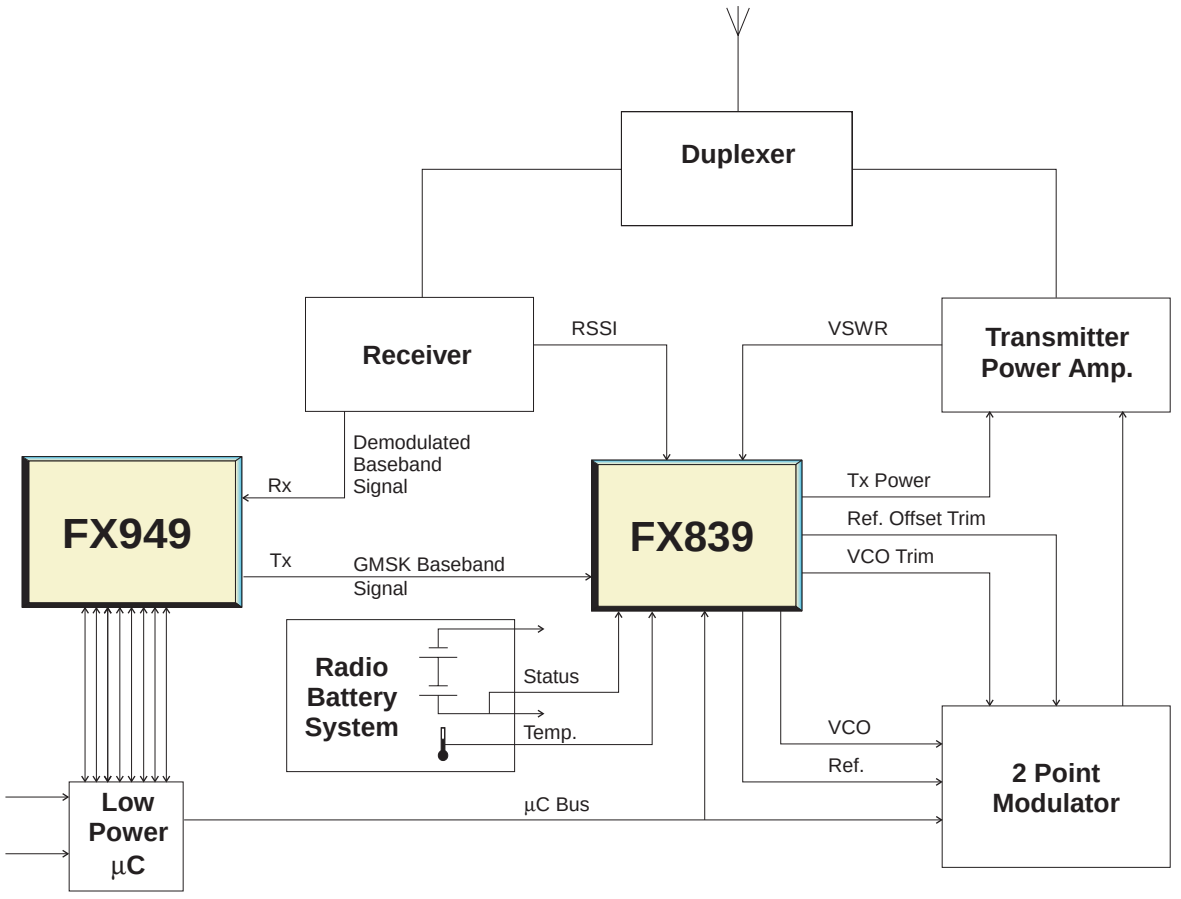

Fig.3 Mobile End Station CDPD Example using the FX949 and the FX839

The key to this successful low power MES design is the use of the FX949 CDPD formatted GMSK modem. The FX949, by using hardware to format data for transmission and to decode incoming data, significantly reduces the demands placed on the host µC. This allows the selection of a low speed, low power µC.

As in our first design example, the FX839 Analogue Control Interface is used to further reduce the demands on the µC, power budget and board space, as it carries out all necessary modulator control attenuation, DAC, ADC tasks.

The facility for IRQ generation on the FX839, can be used to achieve truly useful power savings by allowing the µC to sleep until one of the monitored inputs to one of the FX839's ADCs exceeds its pre-set threshold and generates an IRQ waking up the µC.

The FX949/FX839 combination offers power savings untouchable by the current generation of DSP alternatives.

Circuit Diagram:

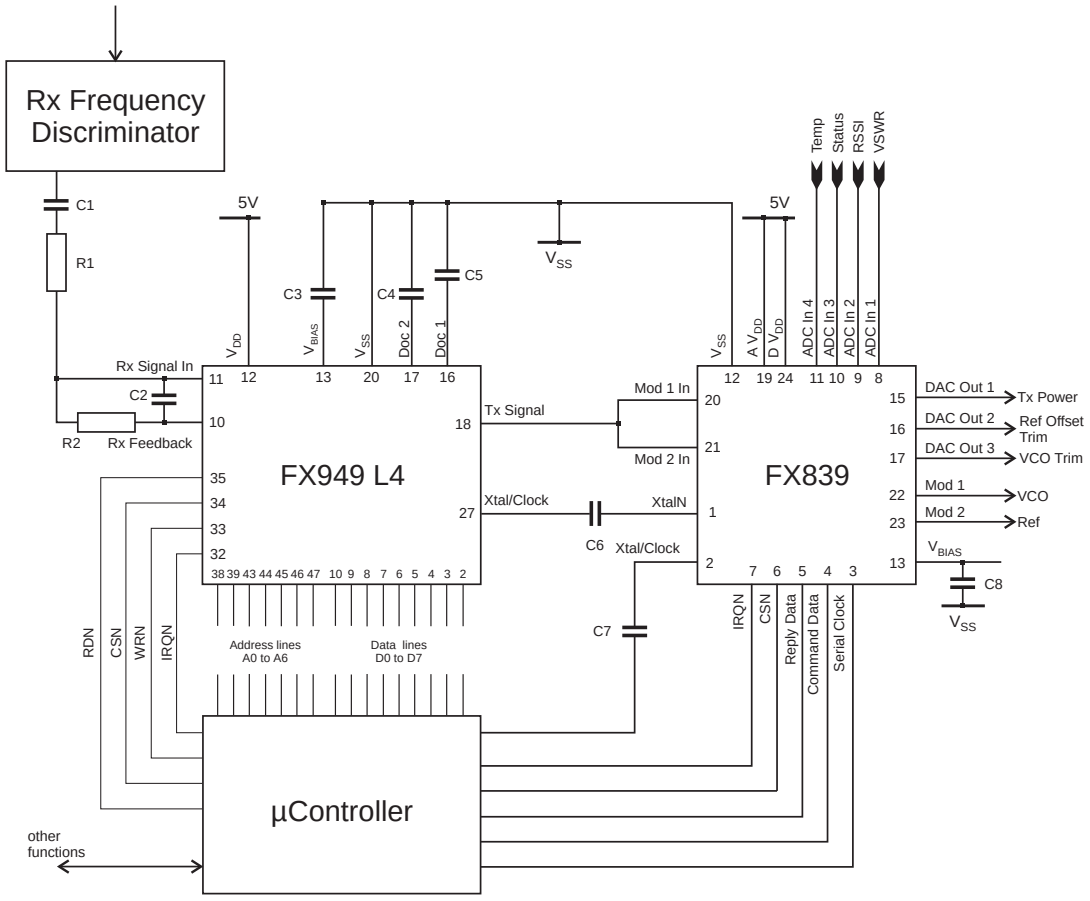

Fig.4 Circuit Diagram of the Previously Described Application

Mobile End Station (MES) Design Figure 4, Components List

Component	Value	Tol/Remarks			
R1	note 1		C1	note 1	
R2	100kΩ	±10%	C2	100pF	±20%
			C3	1.0µF	±20%
			C4	6.8nF	±20%
			C5	6.8nF	±20%
			C6	10pF	
			C7	10pF	
			C8	1.0µF	±20%

Notes

1. R1, R2, C1 and C2 form the gain components for the Rx Input. C1 and R1 should be chosen as required by the signal input level, using the following formula:

- R2/R1

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