NCRA TECHNICAL REPORTS

NEW CONFIGURATION FOR GMRT CONTROL & MONITOR SYSTEM - A PROPOSAL

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Control & Monitor Group

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Abstract :

This note outlines a new approach to the GMRT Control & Monitor system. This is, in part necessiated by a change in the fiber optic uplinks.

Sailent features of the proposal are ;

- Lower complexity and simpler hardware.
- Reduced number of card types.
- Better utilisation of new uplink configuration.

However, some limitaions are;

- No provision for telephony.
- Development of a 3Ø channel RF switch.

Despite the drawbacks, it is felt, this proposal is worth pursuing.

Introduction.

Present scheme of Control & Monitor system provides for a telephone connection to all antennas. These telephones, look like extensions to a centrally located EPABX. All features of the EPABX will be accessible to all antennas. This scheme requires an INDEPENDENT fiber optic link to all antennas. That is, there should be 3Ø pairs of independent fibers and 3Ø pairs of laser diodes(Assuming use of direct modulation). The new configuration envisages, sharing of laser diodes. (Ref.1) With this scheme, it is not possible to have independent voice communication to all antennas. Voice communication also involves external hardware to perform voice and data multiplexing, demultiplexing, clock recovery, framing etc. Good expertise is required in these areas to derive satisfactory performance. If voice communication is not of utmost importance, Control & Monitor system can be simplified significantly. This note addresses such a scenario. In addition, future enhancements are considered.

Outline of the proposed scheme

Fig.1 gives the block schematic of the Revised Control & Monitor system.

Sailent features are;

- Only three types of cards for the complete system.
- Only one new card to be developed (RF SWITCH)
- Clock recovery and framing handled by SCC. No external hardware required.
- Complete end to end diognistics possible through ABC and SCC.

Array Control Computer (ACC) is connected to channel B of the SCC on ABC. ABC and MODEM are combined into a single card. RF port of MODEM is capable of communicating with other MODEMS at centre frequencies from 18 to 2Ø MHz. Suitable UP/DN conversion has to be employed for operation at other frequencies. This is done by UP / DN converters. RF AMP part of the RF system and only a single output from MODEM is required for all the seven laser diodes. On the downlink, an RF Switch (To be developed) is required to switch between the antennas. With GaAs MMICs, this is stright forward. We have the required expertise with Mr.A.Praveen Kumar. Only 3Ø GaAs switches are required for the full array. It is essential to have a spare unit. Cards can be populated gradually as antenas get

comissioned.

Schematics / Block schematics for the three units are attached.

It is possible to have voice communication with the antennas at a later date using the auxilary channels A1 and A2 of the Control & Monitor system. This requires use of low bit rate voice coding techniques (< 16Kbps) like ADPCM, CVSDM etc. Some encoders and decoders are already avaliable. DSP chips offer another solution.

Using the Sun Sparc 1E Board

Sun Sparc 1E board can directly communicate with the Control and Monitor system. This can serve as the ACC or as a component of the ACC system. It is not necessary to have a separate ABC at the CEB. This reduces one level in the Control and Monitor system hierarchy and shifts most of the communication tasks on to the more powerful Sparc 1E. Sparc 1E uses the same SCC as the ABC (Zilog 853Ø/Intel 8253Ø).A good Real Time OS can be ported on to the Sparc 1E.

However, the following need to be considered ;

- SCC on the Sparc 1E does not have a DMA interface. Despite this, data rates of more than 1ØØ Kbps can be realised.

- With the old configuration (Telephony included), transmit and receive clocks to the SCC should come from the Voice and Data Mux/Demux. Sparc 1E has provision for this on one serial channel. This is required to synchronise various data streams at the Mux.

- With the proposed New configuration, there is no need to supply an external clock to the SCC on the 1E board. SCC should be programmed for internal CLK source and DPLL operation.

- It is necessary to use a serial, parallel or SCSI port to be able to switch the receiver to one of the selected antennas by addressing the RF SWITCH. RF SWITCH card should have a matching interface built in.

- It may be necessary to supply an external clock to the SCC on Sparc 1E board to realise the required data rate.

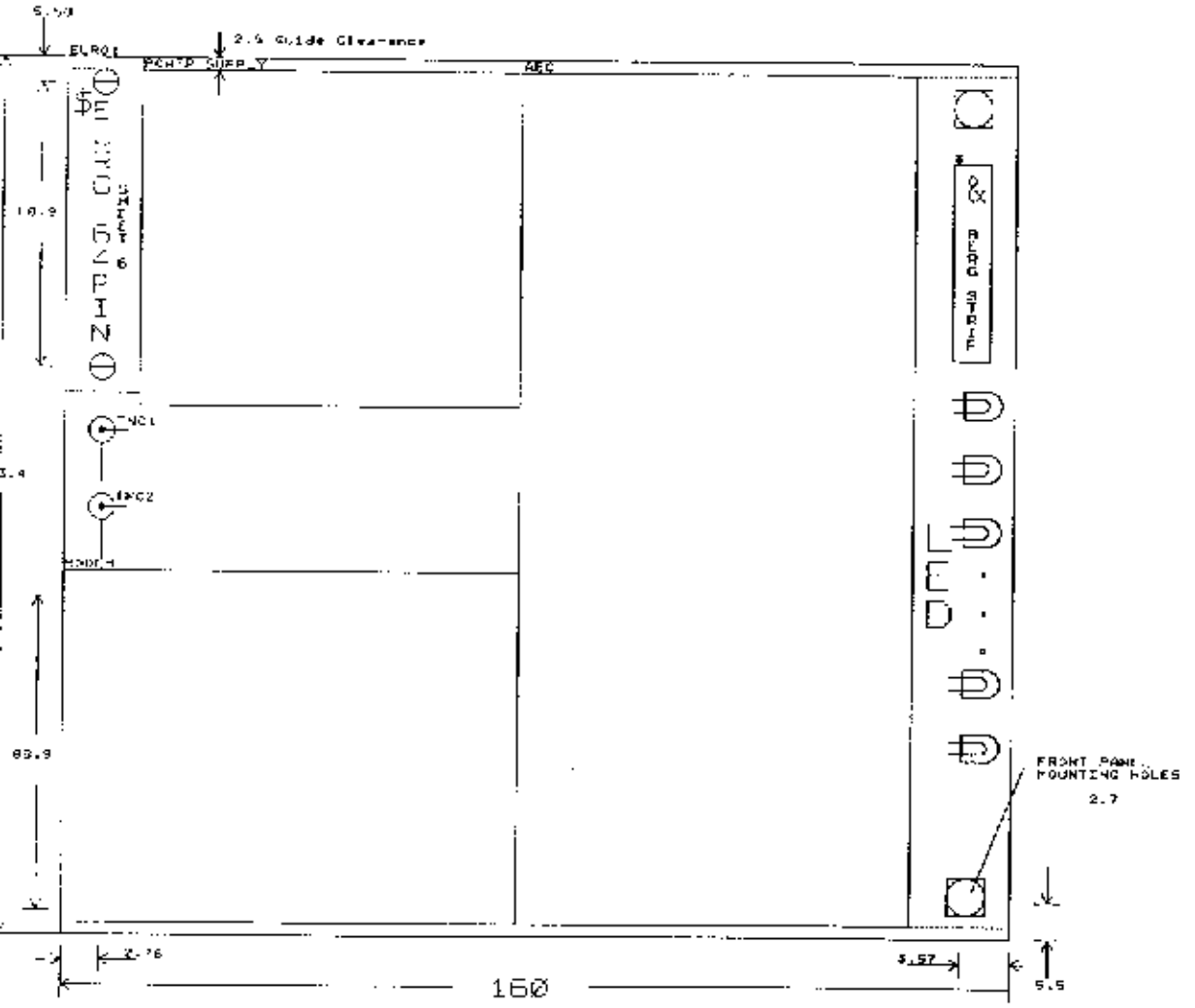
- Currently, there are no SDLC / HDLC drivers avaliable for the Sparc 1E. In future, they are likely to be avaliable with the OS. It may be worthwhile, modifying ABC software at the antennas to conform to one of the standard implementations.

Conclusion

Considering the new uplink configuration and the fact that telephony is not of primary importance, it is felt that the proposal outlined in this note represents an evolution to an optimum, cost effective and reliable Control & Monitor system for GMRT.

References

1. D.S.Sivaraj, A New Configuration for GMRT Fiber Optic Uplinks. Aug 1992. Report Number : FOS/DSS/Ø5/Ø892.



SUGGESTED LAYOUT FOR (ABC + MODEM)

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Title
SUGGESTED LAYOUT OF (ABC + MODEM) CARD

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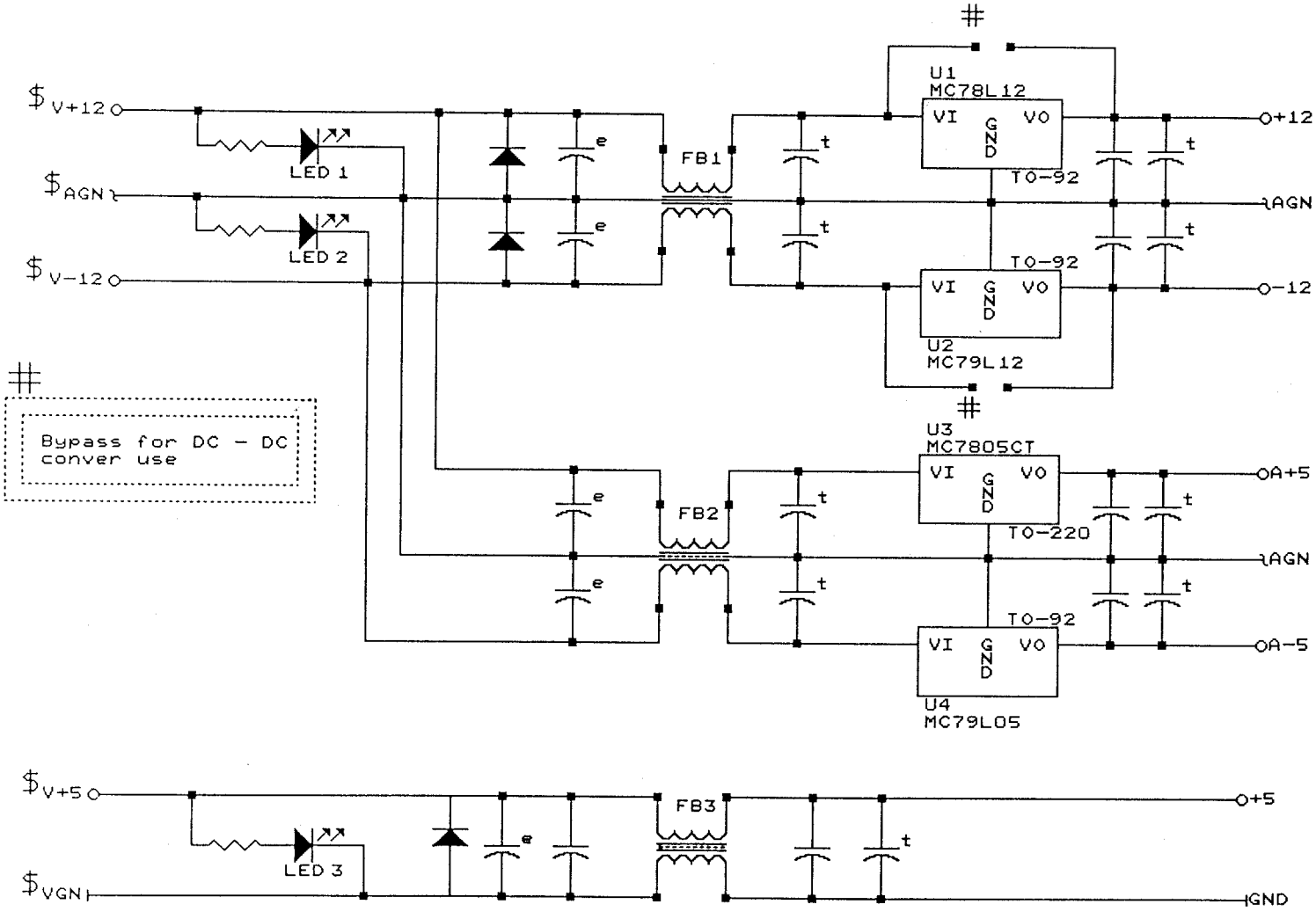

e ELECTROLYTIC .

t TANTALUM .

UNMARKED 0.1UF CERAMIC .

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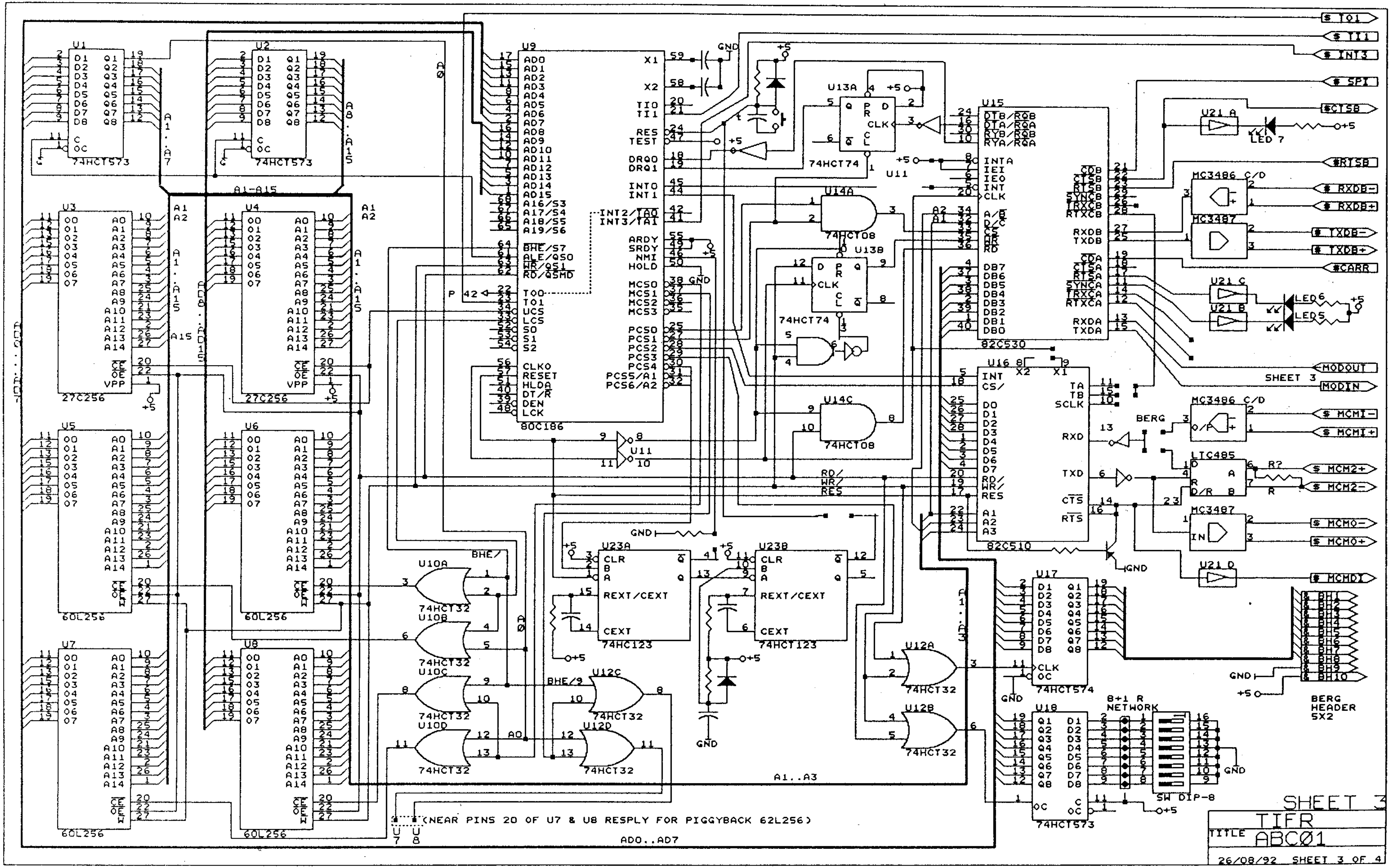
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U14A 74HCT08
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U16 82C510
U17 74HCT574
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U21 A
U21 B
U21 C
U21 D
U23A 74HC123
U23B 74HCT123
MC3486 C/D
MC3487
LTC485
LED 7
LED6
LED5
BERG
8+1 R NETWORK
SW DIP-8
BERG HEADER 5X2
$ TO1
$ TI1
$ INT3
$ SPI
$CTSB
$RTSB
$ RXDB-
$ RXDB+
$ TXDB-
$ TXDB+
$CARR
MODOUT
MODIN
SHEET 3
$ MCMI-
$ MCMI+
$ MCM2+
$ MCM2-
$ MCMO-
$ MCMO+
$ MCMDI
A1-A15
A1..A3
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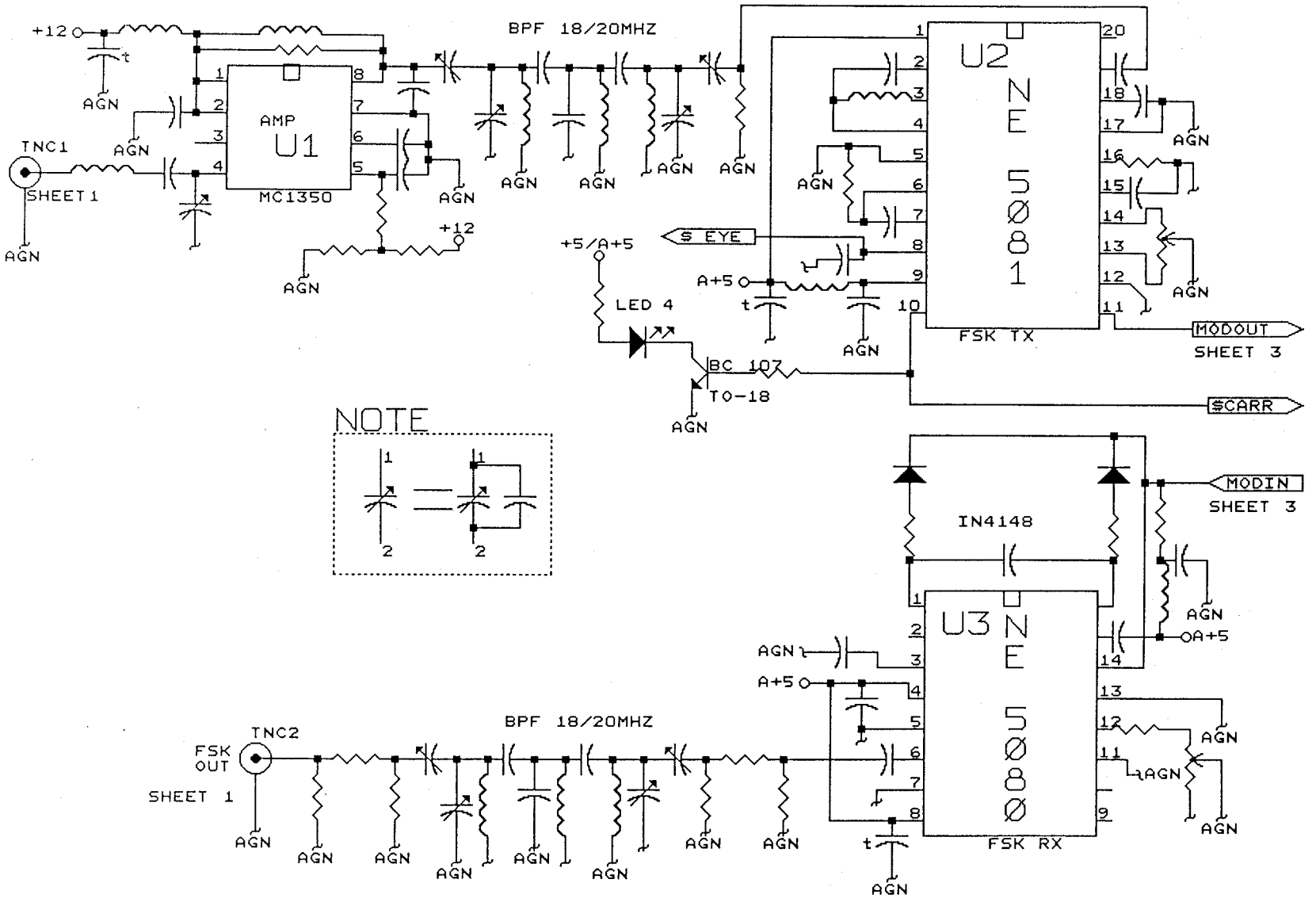
26/08/92 SHEET 3 OF 4



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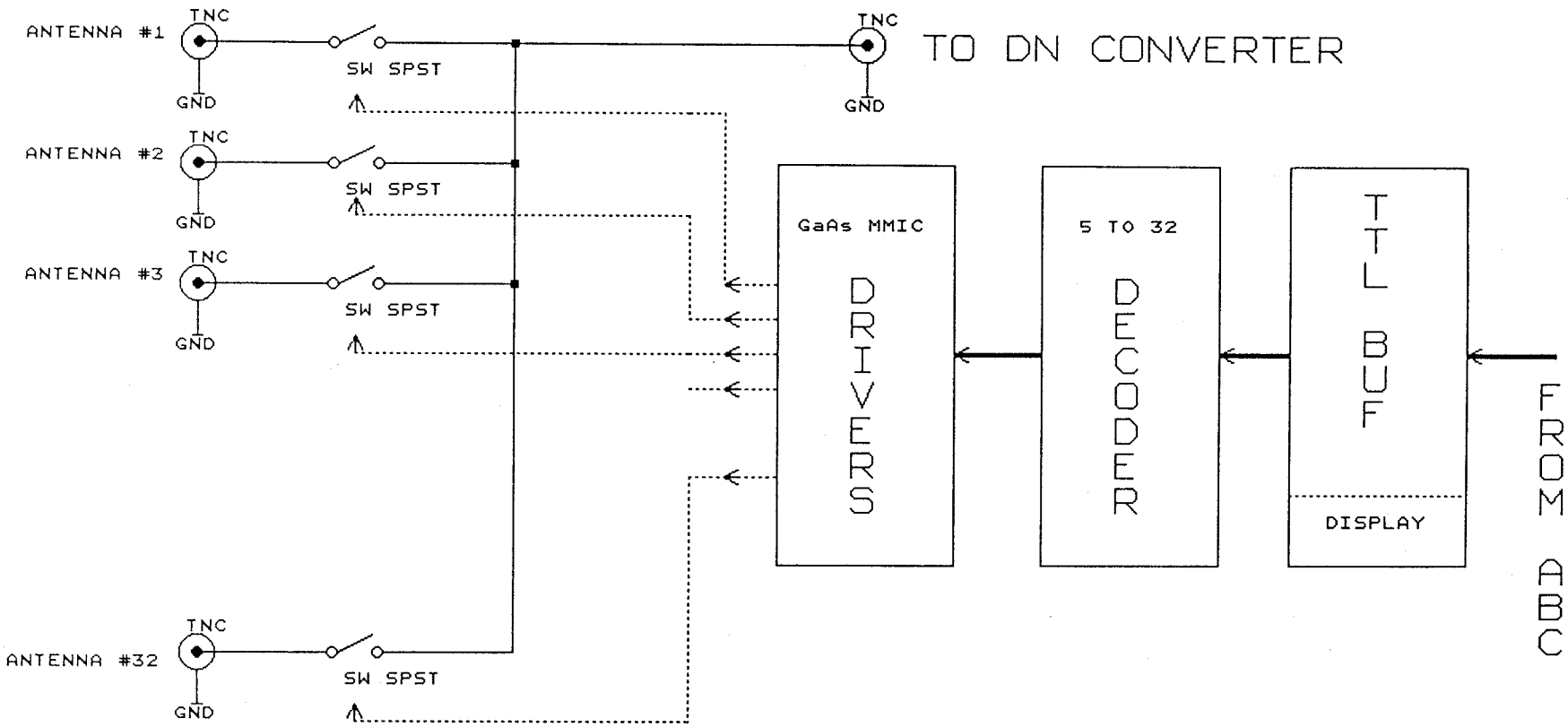

SW SPDT GaAs MMIC

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