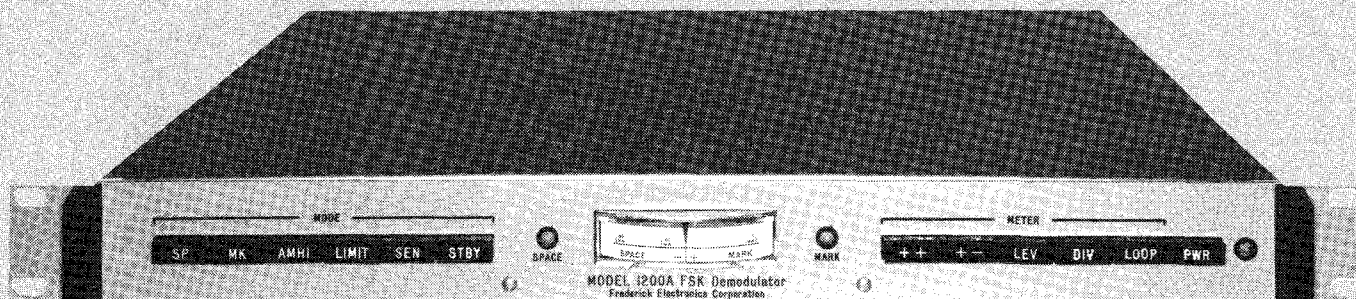


Model 1200A

FSK Demodulator



FEATURES

- **100% SOLID-STATE**
- **EIA RS-232-C AND MIL 188C COMPATIBLE**
- **PLUG-IN FILTERS AND FREQUENCY DETERMINING NETWORKS**

 **PLANTRONICS**
Frederick Electronics

The Model 1200A is a frequency shift tone demodulator designed specifically for use in radio teleprinter applications. Due to the use of the patented * "Decision Threshold Computer" (DTC) technique, outstanding performance is realized for signals derived from the HF radio band.

This technique has been designed to combat the undesirable effects of frequency selection fading which normally plagues HF radio reception, and provides the equivalent of diversity performance (as realized with a ratio detector system) with a single antenna/receiver/demodulator set-up. No separate diversity combiner or comparator unit is required. The "DTC" principle has been widely used in other FEC demodulator designs and has a long history of highly successful operation.

Conventional FSK Demodulators are subject to errors during selective fading on either the mark or space frequencies because of a fixed decision threshold. The Model 1200A, utilizing the DTC, compensates for selective fading by varying its decision threshold to provide optimum detection. The Demodulator provides diversity performance with a single antenna/receiver combination, making it ideally suited to military, commercial, and

amateur RTTY applications where large diversity installations are not possible.

The plug-in mark and space bandpass filters are optimized for the particular frequency shift, tone frequencies, and keying speeds utilized. Plug-in filters not only increase the adaptability of the Demodulator to a variety of signal requirements, but also reduce in-the-field changeover time. As an added feature, the bandpass filter outputs can be used for remote AGC with compatible receivers.

The Model 1200A is of modular, solid-state construction with all components mounted on printed circuit cards. All parts and modules are easily accessed by removing the top cover. Frequency determining networks are mounted on small plug-in subassemblies so that operating parameters may be easily changed.

For more information regarding this, or any other FEC product, please contact any authorized FEC marketing representative.

*Manufactured under U.S. Pat. No. 2,999,925.

OPTIONAL FEATURES

Diversity Demod Board - A plug-in PC board, which accepts a separate audio input, and provides additional diversity operation. Assembly D3770.

Filters - Available filter range covers input signals from 400 Hz to 3500 Hz with shifts from 85 to 1000 Hz and mark/space filter bandwidths from 50 Hz to 500 Hz. Input rates available up to 300 baud.

Loop Supply - A plug-in module supplies up to 60 mA/130 Vdc for neutral loops or up to 60 mA/+65 Vdc for polar loops. Assembly C2324. (External current limiting is required.)

Neutral/Polar Keyer - A keyer board provides dry contacts for keying up to 60 ma/130 Vdc neutral or polar telegraph loops. Assembly C3240 (two required for polar).

SPECIFICATIONS

ELECTRICAL

Input Impedance - Balanced and isolated, 600 ohms; balanced and isolated, 10K ohms; high input Z.

Input Signal - 0 dBm on/off keyed (CW) or audio FSK tones. Available in range of 400 to 3500 Hz.

Linear Operation - 0 to -60 dBm in "normal" mode; 0 to -55 dBm in "mark" or "space" only modes.

Saturation - Signals over +4 dBm will cause clipping. Unit will accept up to +20 dBm without damage.

Baud Rate - Standard TTY rates up to 300 baud, depending upon frequency shift and mark/space filter bandwidth.

Mark/Space Filters - Tone frequencies, 400 to 3500 Hz; bandwidth, 50 to 500 Hz; frequency shifts, 85 to 1000 Hz.

Output Circuit - Detected digital waveform in accordance with EIA Standard RS-232-C.

Detected digital waveform compatible with the low level interface requirements of MIL-STD-188C. Tie points for diversity operation in conjunction with another 1200A (low impedance).

Output Keying - See Optional Features.

Power Requirements - 115/230 Vac, +10%, 50-400 Hz; 10 watts (w/o options).

MECHANICAL

Dimensions - 19 inches wide (48.3 cm), 1- $\frac{3}{4}$ inches high (4.4 cm), 17 inches deep (43.2 cm).

Finish - Chassis is clear anodized. Front panel is painted light gray, engraved and filled.

Mounting - Mounts in a standard 19-inch equipment rack (with or without optional slides).

Weight - Approximately 7 $\frac{1}{2}$ pounds (3.4 kg), w/o options.

Servicing - The top cover of the unit is removable to permit maintenance.

ENVIRONMENTAL

Temperature Range - -10 $^{\circ}$ to +60 $^{\circ}$ C, operating.

Relative Humidity - 0 to 95% (non-condensing).

Atmospheric Pressure - To 15,000 feet.

Shock - 10 G's along any of the mutually perpendicular axes.

Vibration - Exceeds the requirements for MIL-STD-167, Type I.

ORDERING INFORMATION

When placing an order for a Model 1200A, it is necessary to specify the following:

- Mark/Space Tones
- Operating Speeds
- Optional Features

Mark/Space filters are available from 400 Hz to 3500 Hz. Some of the more popular filters and baud rates are shown in the tables to the right. Many other filters are available on request.

Parameters must be reviewed by an authorized FEC marketing representative.

TYPICAL TONE FILTERS

1000 Hz	2100 Hz
1275 Hz	2125 Hz
1575 Hz	2295 Hz
1700 Hz	2425 Hz
1850 Hz	2975 Hz

TYPICAL BAUD RATES

45	110
50	150
75	300

ALL SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTIFICATION

FREDERICK ELECTRONICS CORPORATION

Hayward Road/Post Office Box 502/Frederick, Maryland 21701
Telephone: (301) 662-5901 / Cable FREDCO / Telex: 893438

Date: 5/78

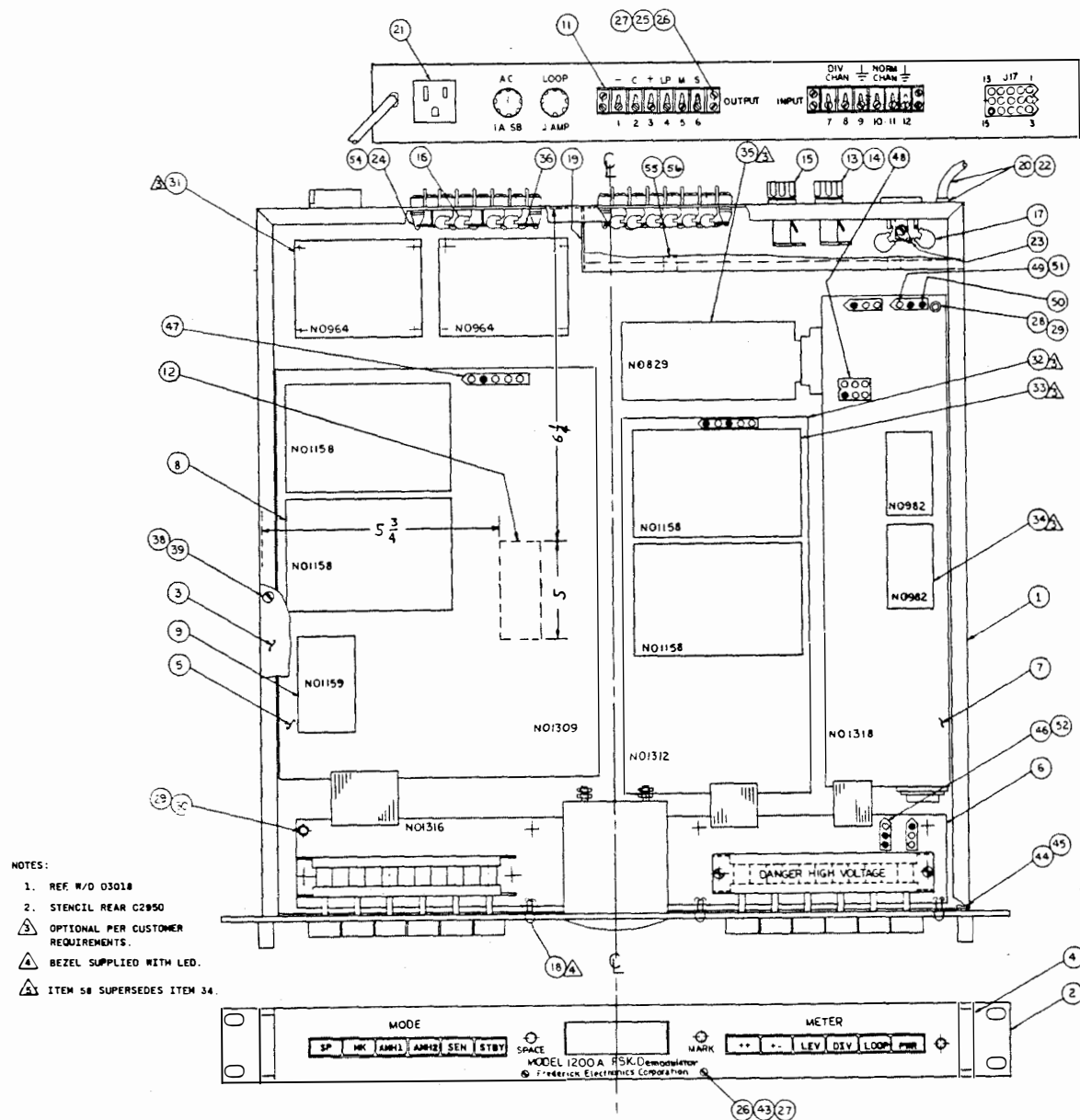


Figure 7-1. Model 1200A Assembly
D3064D

58	1	C3240	HI-LEVEL KEYS	FEC					
57	1	C1470	CHASSIS SLIDE	FEC					
56	2		SCREW, 4-40x5/16 LG BD HD	SST	404203				
55	2	C15263-42-24	SPEED NUT	TINNEMAN	403170				
54	2	B1558	INSULATOR	FEC					
53	A/R		WIRE, 24 GA	ALPHA					
52	A/R		SHIELDED 3 CONO, 24 GA	DELCO					
51	A/R		SHIELDED 2 CONO, 24 GA	DELCO					
50	10	1560-TL8	PIN MALE	MOLEX	744400				
49	18	1561-TL8	PIN FEMALE		744410				
48	1	1625-6R1	CONNECTOR 6 PIN		246304				
47	2	1625-5R1	CONNECTOR 5 PIN		246301				
46	4	1625-3R1	CONNECTOR 3 PIN	MOLEX	246275				
45	4		WASHER NO. 6 SPLIT LOCK	SS	404895				
44	4		SCREW, 6-32x3/8 FILLISTER HD	SST	404375				
43	2		SCREW, 4-40x3/8 OVAL HD	SST	404213				
42									
41									
40									
39	7		SCREW NO. 6-32x5/16 FL HD	UNDERCUT SST	404368				
38	7	C8020-632-67	SPEED NUT NO. 6	TINNEMAN	403180				
37	A/R	SST1	CABLE TIES	PANOUT					
36	A/R		14 GAUGE COPPER WIRE	ALPHA					
35	1	C2324B	ASSY. LOOP POWER SUPPLY	FEC					N0829A
34	2	C2434	ASSY. HI-LEVEL KEYS						N0982
33	2	O2818	ASSY. BAND PASS FILTERS						N01158
32	1	D1770	ASSY. DIVERSITY						N01490
31	2	C2362	ASSY. HI-IMPEDANCE INPUT	FEC					N0984
30	8		SCREW, 6-32x1/4 LG BD HD	SS	404361				
29	23		WASHER NO. 6 INT TOOTH	SS	404891				
28	13		SCREW NO. 6-32x5/16 LG BD	HD SST	404369				
27	10		NUT HEX NO. 4-40x1/4 AF	SST	403030				
26	6		WASHER NO. 4 INT TOOTH		404878				
25	8		SCREW NO. 4-40x1/2 LG BD HD	SST	404220				
24	4	1416-4	SOLDER LUG NO. 4	SWITH	242754				
23	1	1416-6	SOLDER LUG NO. 6	SWITH	242756				
22	1	5P-4	STRAIN RELIEF	HEYCO	688025				
21	1	M1536G5	RECEPTACLE	CIRCLE F	247025				
20	1	11737	LINE CORD	BELOEN	366050				
19	1	C2989-1	REAR COVER	FEC					
18	3	FLV-112	LEO	FAIRCHILD	040027				
17	2	D0502	CAPACITOR .005MF 1KV	CRL	021510				
16	10	B01X5F102K	CAPACITOR .001MF 1KV	ERIE	021300				
15	1	312-100	FUSE 1/10 AMP	LITTLEFUSE	368050				
14	1	313-001	FUSE 1 AMP SLO-BLO	LITTLEFUSE	368250				
13	2	342004	FUSEHOLDER	LITTLEFUSE	368425				
12	A/R		RUBBER STRIP 3/8 X 1	POT. RUB.					
11	2	6-140-Y	BARRIER STRIP	C-J	100300				
10				FEC					
9	1	O2813	ASSY. LOW PASS FILTER						N01159
8	2	O2818	ASSY. BAND PASS FILTER						N01158
7	1	O2962	ASSY. POWER SUPPLY						N01318
6	1	O2963	ASSY. SWITCH						N01316
5	1	O3739	ASSY. DEMODULATOR		409030				N01483
4	2	B1132	HANDLES						
3	1	C3001	COVER						
2	1	O2940	ENGRAVING, FRONT PANEL						
1	1	O2985	CHASSIS	FEC					
ITEM	REQD	PART NO	DESCRIPTION	WATL OR MFG	WATL SPEC OR CAT PART NO	FINISH	FINISH SPEC	CAT STD	

LIST OF MATERIAL

Figure 7-1. Parts List

DM.4.3 AUTO MARK-HOLD CIRCUITS

The auto mark-hold circuits do not function in an AMH2 mode. Refer to Sheet 2 of the schematic diagram. A LL0 applied to J12-19, when the AMH1 pushbutton is depressed, enables NAND gates Z27-C and Z22-C. Thus, the mark-hold condition is obtained when either (or both) mark and/or space outputs of the DTC circuit fall below threshold condition. In linear operation the threshold is at approximately -10 dbm; in limiter operation the threshold is at approximately -50 dbm.

DM.4.4 SCHMITT TRIGGER/SELECTOR CIRCUITS

The Schmitt trigger/selector circuits differ from those of the N01309 board in the biasing arrangement and the control of the DTC circuit. Refer to Sheet 2 of the schematic diagram. Since mark and space circuits are identical, only the mark circuit is described.

The biasing arrangement for JFET switch transistor Q8 and switch transistor Q7 is such to assure proper turn-ON of Q8.

When the MARK pushbutton switch is depressed, a LL0 applied to J12-20, turns Q5, Q6, and Q4 OFF. This prevents application of space signals to the operational amplifier and inhibits operation of the continuous-level input detector portion of the mark DTC circuit as described in Paragraph DM.4.2.

DM.5 ALIGNMENT AND ADJUSTMENT PROCEDURES

DM.5.1 REQUIRED TEST EQUIPMENT

The following test equipment (or equivalent) is required in addition to that listed in Table 5-1 of the Model 1200A/1273 Instruction Manual:

1. Digital Distortion Analyzer, Digitech Model 2683-01.
2. Message Generator, Frederick Electronics Model 1306A.

DM.5.2 MARK CHANNEL GAIN ADJUSTMENT

Proceed as follows:

1. Set up the equipment as shown in Figure 5-1 of the Model 1200A (or 1273) Instruction Manual, with the signal generator connected to pins 10 and 11 of TB1 and the VTVM connected as shown by the dotted line (the LIMIT MODE pushbutton should be in the out position).
2. Apply a space tone at -10 dbm.

3. Reconnect the VTVM between pins 1 and 10 of J17; measure and note space filter output level.
4. With the VTVM connected as indicated by the dotted line in Figure 5-1, apply a mark tone at -10 dbm.
5. Reconnect the VTVM between pins 4 and 10 of J17 and measure the mark filter output level.
6. Adjust MARK LEVEL potentiometer R29 to obtain the same level as noted in Step 3.
7. If a diversity board is used in the 1200A unit, perform Steps 1 through 6 on the diversity board with the signal generator connected to pins 7 and 8 of TB1.

DM.5.3 MARK AND SPACE RECTIFIER OFFSET

Proceed as follows:

1. Electrically disconnect diversity board (N01490), if used, from its connector.
2. Disconnect connector J13 from the Demodulator board (N01483).
3. Connect oscilloscope probe to pin 1 of J17 (select its most sensitive input) and oscilloscope ground to pin 10 of J17.
4. Adjust mark RECT OFFSET potentiometer R36 for zero-volt dc.
5. Reconnect oscilloscope probe to pin 4 of J17.
6. Adjust space RECT OFFSET potentiometer R45 for zero-volt dc.
7. If diversity board N01490 is used in the 1200A unit, adjust diversity channel mark and space rectifier offset as follows:
 - a. Adjust Demodulator board N01483 RECT OFFSET potentiometers prior to adjusting the diversity channel.
 - b. Ensure that J11 is connected and that J15 is disconnected.
 - c. Perform Steps 3 through 6 adjusting R4 for the mark offset and R2 for the space offset.

DM.5.4 MARK AND SPACE DTC OFFSET

Proceed as follows:

1. Connect the output of the message generator to the data input of the tone keyer.
2. Connect the FSK output of the tone keyer as illustrated in Figure 5-2 of the Model 1200A (or 1273) Instruction Manual, with the FSK signal connected to pins 10 and 11 of TB1.
3. Make certain that the message generator and tone keyer are set at the proper baud rate and mark and space frequencies.
4. Connect distortion analyzer between pin 7 and pin 10 (ground) of J17.
5. Set message generator for steady mark output.
6. Set the attenuator to zero and ensure that the input to the 1200A/1273 is 0 dbm; adjust the output level of the tone keyer, if necessary, to obtain 0 dbm.
7. Set the message generator to produce a reversals output.
8. Adjust attenuator to obtain a -30 dbm input to the 1200A/1273 unit.
9. Set distortion analyzer for polar input, bias distortion, filter control -- OUT, and for operation at appropriate baud rate (all equipment should be operating at the same baud rate).
10. Depress the SP MODE pushbutton on the front panel of the 1200A/1273 unit.
11. Adjust SPACE DTC OFFSET potentiometer R83 for the lowest distortion indication on the distortion analyzer.
12. Release SP MODE pushbutton and depress MK MODE pushbutton.
13. Adjust MARK DTC OFFSET potentiometer R86 for the lowest distortion indication on the distortion analyzer.

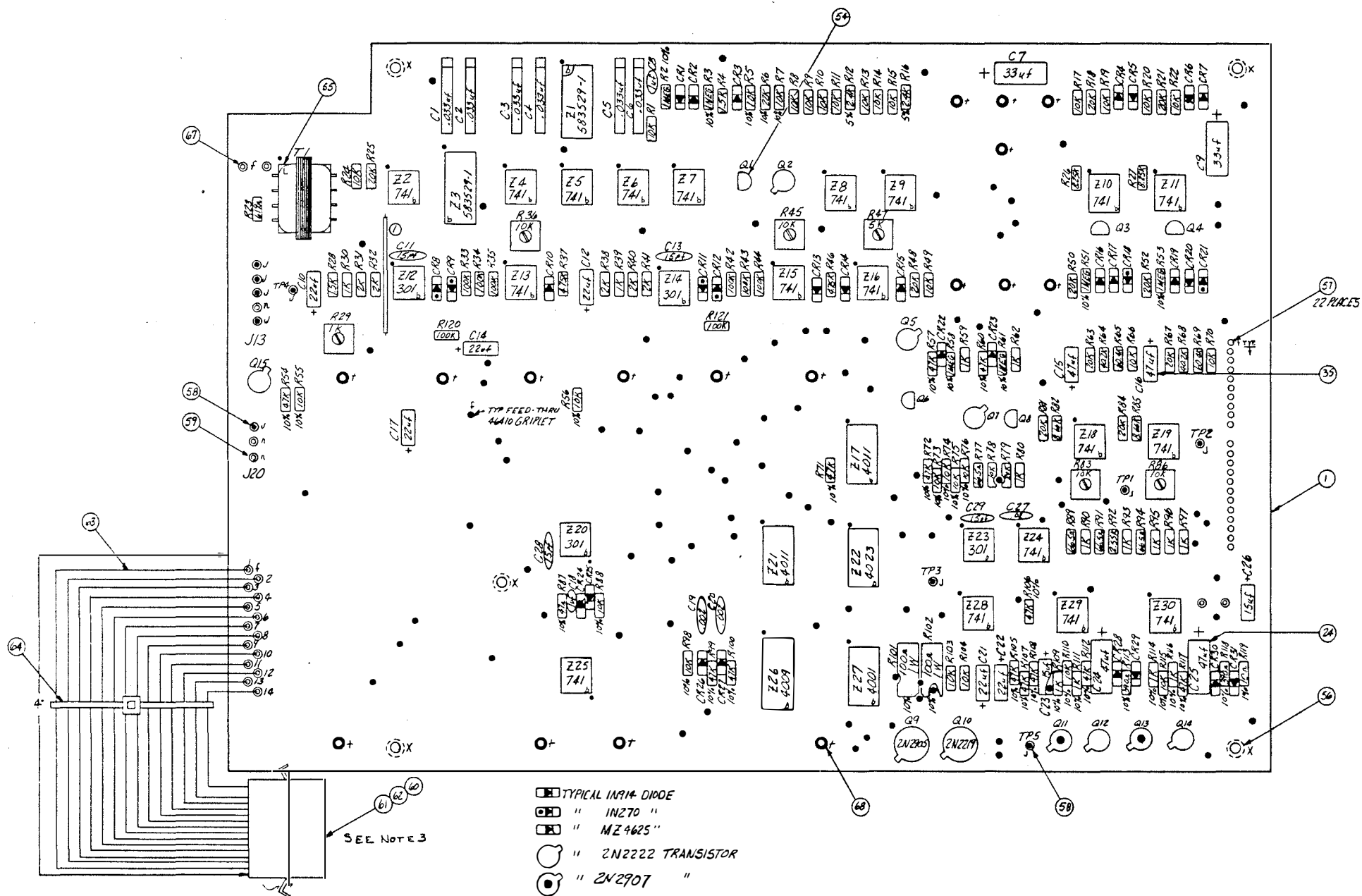


Figure DM-5. Demodulator Board NO1483 Assembly
D3739

NOTES:

1. SCHEMATIC REFERENCE D3738.
2. UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE 1/4W 1%.
3. WIRE MOLEX RECEPTACLE PIN FOR PIN WITH PC BOARD USING 1380TL PINS. PIN 15 WILL BE 1381TL AND REMAIN UNUSED.
4. UNLESS OTHERWISE SPECIFIED DRILL ALL HOLES NO. 55 (.052) DR. & INSTALL 46410 GRIPLETS.
 - b NO. 68 (.031) DR. FOR I.C.'S.
 - f NO. 55 (.052) DR. - 18 PLACES & INSTALL EYELETS.
 - f NO. 55 (.052) DR. - 22 PLACES & INSTALL MINI-INSERTS.
 - j NO. 52 (.063) DR. - 10 PLACES & INSTALL ITEM 58.
 - n NO. 43 (.089) DR. - 3 PLACES & INSTALL ITEM 59.
 - t NO. 30 (.128) DR. - 17 PLACES & INSTALL ITEM 68.
 - x NO. 11 (.191) DR. - 5 PLACES & INSTALL ITEM 56.
 - 1 NO. 49 (.073) DR. - 8 PLACES & INSTALL ITEM 55.

5. RESISTOR VALUES REQUIRED FOR DWG NO. ARE PROGRAMMED & WILL DEPEND ON CUSTOMER REQUIREMENTS.

6. ITEMS 69 & 71 USED IN ACCORDANCE WITH CUSTOMER REQUIREMENTS AND/OR SPECIFICATIONS.

60	1	1375R	RECEPTACLE	MOLEX	246125
59	3	M93-102ET	STAKE-PIN (FEMALE)	B.CHAIN	744555
58	10	R62-3ET	STAKE-PIN (MALE)	B.CHAIN	744550
57	22	2-331272-1	MINI-INSERTS	AMP	247065
56	5	1246-12	STANDOFF	CTC	683182
55	1	PC-SO-21	TRANSFORMER	UTC	765033
54	5	2N5461	TRANSISTOR	MOT	080835
53	1	2N2905		MOT	080520
52	1	2N2219		MOT	080469
51	2	2N2907		MOT	080522
50	6	2N2222	TRANSISTOR	NAT	080467
49	2	583529-1	SOCKET	AMP	248106
48	1	CD4023A	INTEGRATED CIRCUIT	RCA	061220
47	2	CD4011A		RCA	061180
46	1	CD4009A		RCA	061170
45	1	CD4001A		RCA	061175
44	19	LM741CN		NAT	060140
43	4	LM301CN	INTEGRATED CIRCUIT	NAT	060080
42	4	M24625	DIODE	MOT	040661
41	21	1N914	DIODE	GE	040238
40	6	1N270	DIODE	TI	040044
39	1	RESISTOR 100 1/4W 1%		CORNING	624005
38	2	1500156X9020B2	CAPACITOR 20V	SPRAGUE	028572
37	1	5835Y5U203Z	02MFD 25V	ERIE	021580
36	2	2130GMO50R105M	1MFD 50V	VARADYNE	029141
35	2	1500476X9006B2	47MFD 6V	SPRAGUE	028704
34	2	1500476X9020B2	47MFD 20V	SPRAGUE	028726
33	2	1500336X9020R2	33MFD 20V	SPRAGUE	028660
32	6	1500226X9015B2	22MFD 15V	SPRAGUE	028594
31	6	12FR333-1C12FR	.033MFD 100V	MIDREC	029045
30					
29	4	00150	15pF 1KV	CRL	021020
28	2	00202	CAPACITOR .002MFD 1KV	CRL	021360
27	1	72PR1K	POTENTIOMETER 1K	BECKMAN	627134
26	4	72PR10K	POTENTIOMETER 10K	BECKMAN	627415
25	1	72PR5K	POTENTIOMETER 5K	BECKMAN	627325
24	8	RN5501003F	RESISTOR 100K 1/4W 1%	CORNING	625811
23	4	RN60066R5F	66.50 1/2W 1%		624043
22	2	RN6006042F	60.4K		625749
21	2	RN6004022F	40.2K		625671
20	11	RN6002002F	20K		625504
19	19	1002F	10K		625288
18	2	8661F	8.66K		625234
17	2	8251F	8.25K		625208
16	2	4751F	4.75K		624880
15	5	2001F	2K		624490
14	2	1501F	1.5K		624400
13	10	1001F	1K		624300
12	1	RN6006190F	6190 1/2W 1%	CORNING	624180
11	2	RC326F101K	1000 1W 10%	AB	606175
10	1	RC07GF242J	2.4K 1/4W 5%	AB	601336
9	1	RN6002551F	2.55K 1/2W 10%	CORNING	624580
8	2	RC07GF391K	3900 1/4W 10%	AB	602312
7	6	105K	1 MEG.		602792
6	13	473K	47K		602636
5	1	223K	22K		602588
4	12	103K	10K		602540
3	4	102K	1K		602372
2	1	RC07GF470K	RESISTOR 470 1/4W 10%	AB	602180
1	1	NO1483	PC BOARD	FEC	
ITEM	REQD	PART NO.	DESCRIPTION	MFR	CAT. NO.

LIST OF MATERIAL

71	1	D2813	LOW PASS FILTER	FEC	
70	1	D4029	PROGRAMMABLE RES. CHIP	FEC	
69	2	D2818	BAND PASS FILTER	FEC	
68	17	A919	EYELET	US	
67	18	S6064	EYELET	US	
66	A/R	46410	GRIPLET	BERG	
65	1	J1.500X0.250T22	JUMPER	SQ. EL.	
64	A/R	SST1	TIE WRAP	PANDUIT	
63	A/R		WIRE 24 GA. WHITE	ALPHA	
62	1	1381TL	TERMINAL (FEMALE)	MOLEX	744325
61	14	1380TL	TERMINAL (MALE)	MOLEX	744300
ITEM	REQD	PART NO.	DESCRIPTION	MFR	CAT. NO.

Figure DM-5. Parts List



Figure DM-3. Demodulator Board NO1483, Schematic Diagram
D3738, Sheet 2

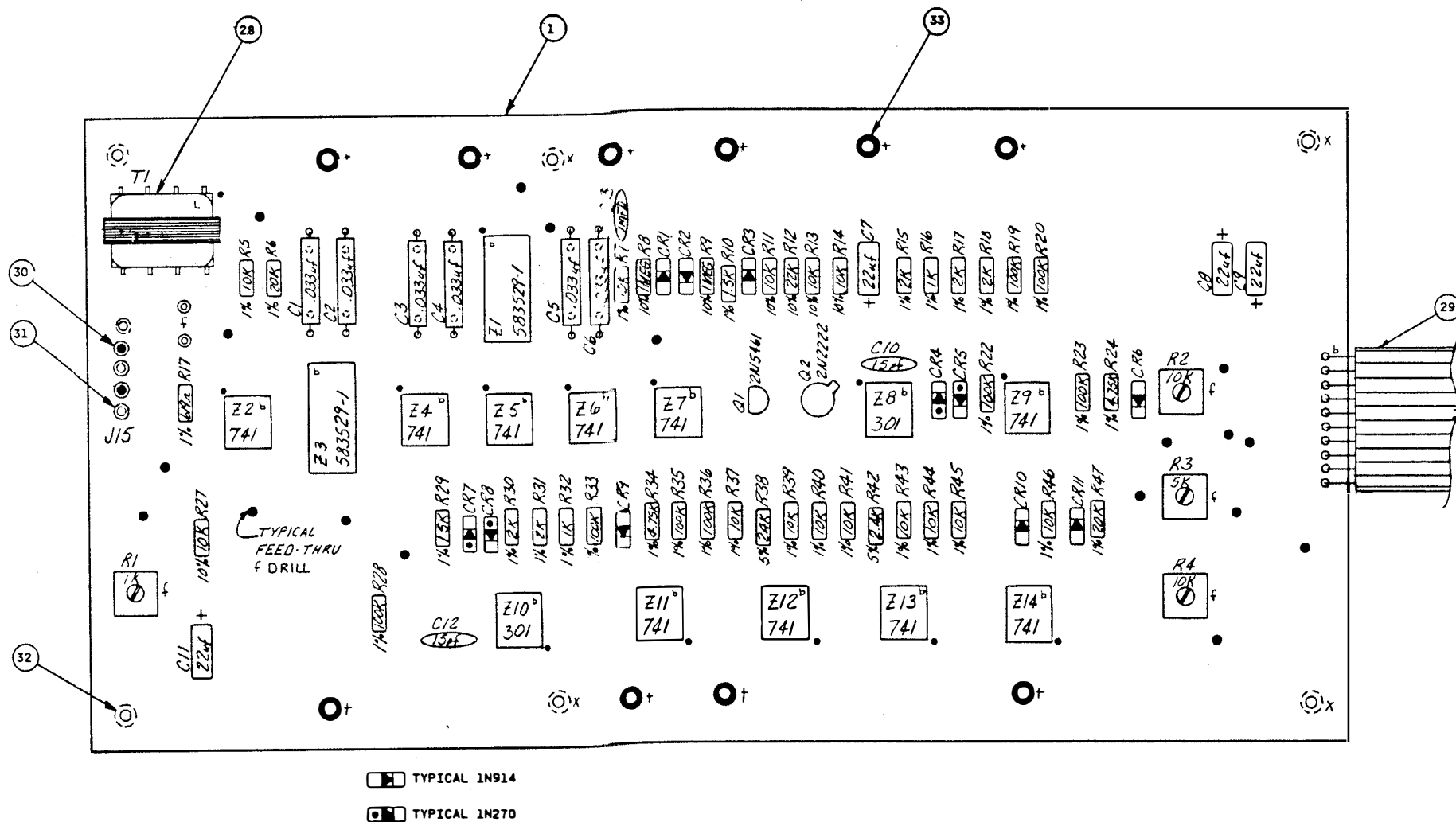


Figure DM-6. Optional Diversity Demodulator Board NO1490 Assembly
D3770A

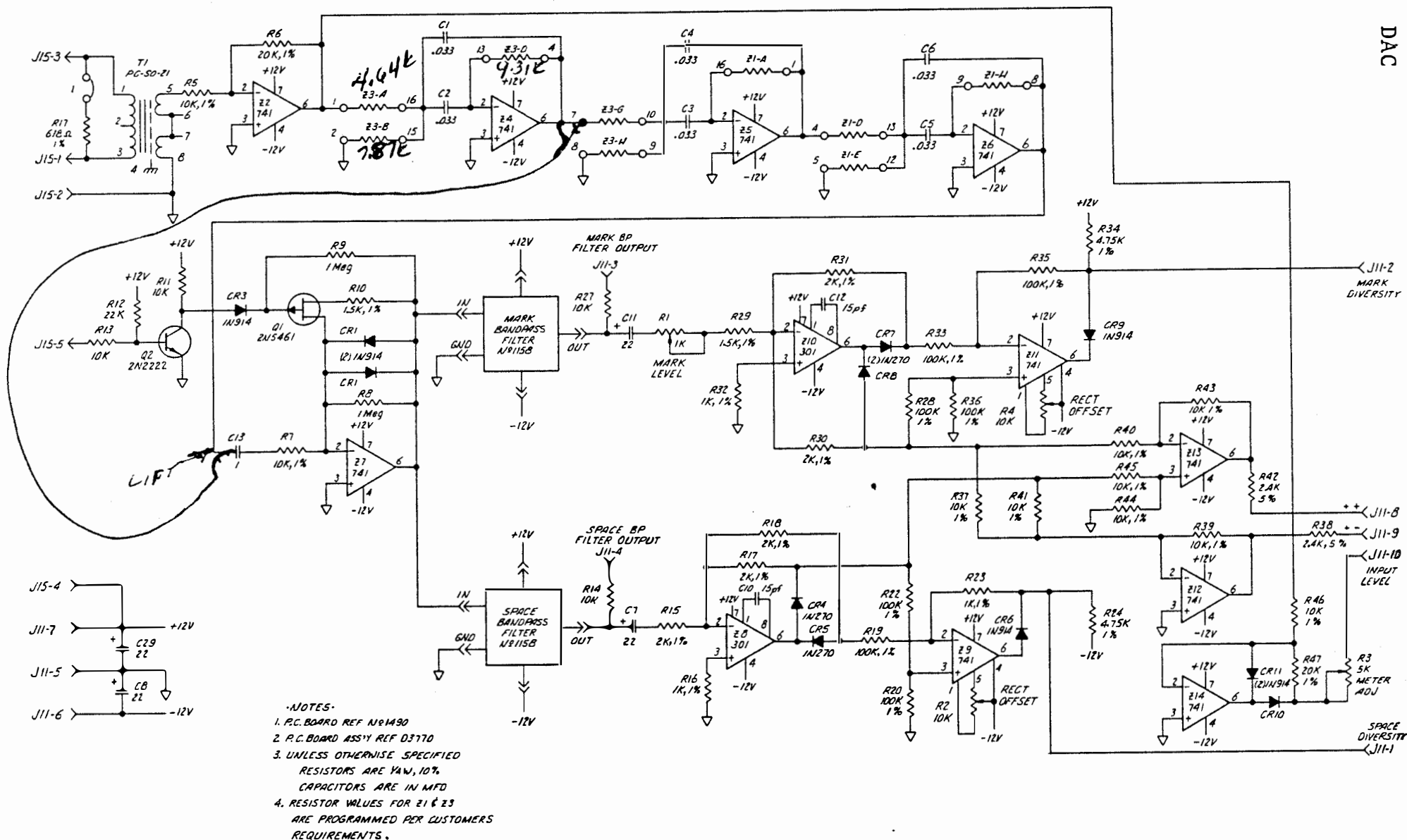


Figure DM-4. Optional Diversity Demodulator Board N01490, Schematic Diagram
D3771

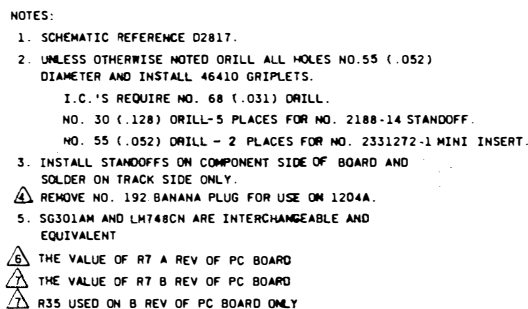


Figure 7-3. Mark-Space Bandpass Filter Assembly
Sheet 1, D2818

 THE VALUE OF R7 FOR A REV OF PC BOARD
 THE VALUE OF R7 FOR B REV OF PC BOARD
 R35 USED ON B REV OF PC BOARD ONLY

6	THE VALUE OF R7 FOR A REV OF PC BOARD
7	THE VALUE OF R7 FOR B REV OF PC BOARD
7	R35 USED ON B REV OF PC BOARD ONLY

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 THE VALUE OF R7 FOR A REV OF PC BOARD
 THE VALUE OF R7 FOR B REV OF PC BOARD
 R35 USED ON B REV OF PC BOARD ONLY



6. THE VALUE OF R7 FOR A REV OF PC BOARD
7. THE VALUE OF R7 FOR B REV OF PC BOARD
7. 035 USED ON B REV OF PC BOARD ONLY

Figure 7-3. Mark-Space Bandpass Filter Assembly
Sheet 5, D2818

	THE VALUE OF R7 FOR A REV OF PC BOARD
	THE VALUE OF R7 FOR B REV OF PC BOARD
	R35 USED ON B REV OF PC BOARD ONLY

Figure 7-3. Mark-Space Bandpass Filter Assembly
Sheet 6, D2818

5 THE VALUE OF R7 FOR A REV OF PC BOARD
A THE VALUE OF R7 FOR B REV OF PC BOARD
A R35 USED ON B REV OF PC BOARD ONLY

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Figure 7-3. Mark-Space Bandpass Filter Schematic Diagram
Sheet 8, D2818