FR-5A/U FREQUENCY METER

FR-5/U FREQUENCY METER

10-100 MEGACYCLES

Basic Freq X Harmonic
Number = Input Frequency

AMECO ELECTRONIC CORP.

571-300-004

FREQUENCY METER FR-5/U
OPERATING INSTRUCTIONS

PRELIMINARY INSTRUCTIONS

Open door at rear of instrument, remove power cord, and insert plug into a suitable 115 volt, 50 to 1000 cps, a-c power source. For 230 volt operation, refer to the technical manual. Turn POWER switch to right, insert headphone plug into PHONE jack and couple RF INPUT coaxial connector to the source of unkown frequency. Allow a minimum of 20 minutes warmup time.

INSTRUCTIONS FOR MEASUREMENT OF UNKNOWN FREQUENCY

STEP 1 Turn RANGE switch to the setting which includes the unknown frequency within its limits. If the approximate frequency is unknown, set RANGE switch to the lowest frequency band.

STEP 2 With the LEVEL control fully clockwise and the FUNCTION SWITCH at COARSE, rotate COARSE tuning knob until an audio tone is heard in the headphones. If the approximate frequency is unknown, it may be necessary to switch bands in order to locate this tone. The approximate frequency in megacycles will be shown in the illuminated MEGACYCLES window of the COARSE tuning dial.

STEP 3 Turn LEVEL control fully counter clockwise; then rotate LEVEL control clockwise until needle on TUNING METER is in the green LEVEL SET area. Carefully maximize meter reading by tuning COARSE knob. Readjust LEVEL control if necessary to keep needle of TUNING METER in green area.

STEP 4 Turn FUNCTION SWITCH to FINE and rotate FINE tuning knob until a loud low frequency audio beat note is heard in the headphones. Tune to approximately zero beat.

STEP 5 Calibrate the instrument as follows:

a. Turn the FUNCTION SWITCH to CHECK.

b. While looking into the FINE tuning window (above the FINE tuning knob) rotate FINE tuning knob until a black diamond shaped mark is lined up with the hairline on the window under CH'K (arrows on the film in the window point in the direction of the diamond).

c. Carefully adjust the CHECK knob until the beat note, which should be heard in the headphones, goes to zero beat and the TUNING METER reading is zero.

STEP 6 Return FUNCTION SWITCH to FINE and again rotate FINE tuning knob until the loud beat note is heard in the headphones. Carefully adjust the FINE tuning knob until a zero beat is heard in the headphones and the TUNING METER needle goes to zero or fluctuates slowly.

NOTE:—IF THE SIGNAL BEING MEASURED IS NOT SUFFICIENTLY STABLE IN FREQUENCY, AN ESTIMATE OF ZERO BEAT MUST BE MADE.

STEP 7 Observe the illuminated HARMONIC window of the COARSE tuning dial to determine that hairline falls ***on*** numbered black rectangle. If not, a spurious beat note has been used or a mistake has been made. Steps 3, 4, 5, 6, and 7 must be repeated until a beat note is found for which the hairline does fall on a numbered black rectangle.

STEP 8 The instrument is now tuned to the unknown frequency. Proceed to determine this frequency in the CALIBRATION TABLES as follows:

a. Turn to the section of the CALIBRATION TABLES which is the same color as the illuminated portion of the COARSE tuning dial.

b. Turn to the page number indicated under PG in the FINE tuning window.

c. Read the BASIC FREQ. in the FINE tuning window and locate this number in the column of the CALIBRATION TABLES headed BASIC FREQ.

d. Locate the HARMONIC column to be used on the COARSE tuning dial. This is presented as a numbered black rectangle in the illuminated HARMONIC window.

e. At the intersection of the line containing the BASIC FREQ., found in Step 8c, and the HARMONIC column, found in Step 8d, read the frequency in MEGACYCLES PER SECOND. This is the frequency of the signal being measured.

INSTRUCTIONS FOR SETTING TO DESIRED FREQUENCY

STEP 1 Set the RANGE switch to the band which includes the desired frequency.

STEP 2 Turn to the section of the CALIBRATION TABLES which is the same color as the illuminated portion

of the COARSE tuning dial. On page 1 of this section, determine, from the first frequency in each HARMONIC column, the HARMONIC which contains the desired frequency.

STEP 3 Follow this HARMONIC column through the book and locate the desired frequency or the closest listed frequency to the desired.

STEP 4 On the same line as this frequency, note the number in the column headed BASIC FREQ.

STEP 5 Rotate the FINE tuning knob until this BASIC FREQ. appears in the FINE tuning window.

STEP 6 Calibrate the instrument as described in Step 5 of INSTRUCTIONS FOR MEASUREMENT OF UNKNOWN FREQUENCY.

STEP 7 Return the FUNCTION SWITCH to FINE and re-set the film in the FINE tuning window to the BASIC FREQ. found in Step 4.

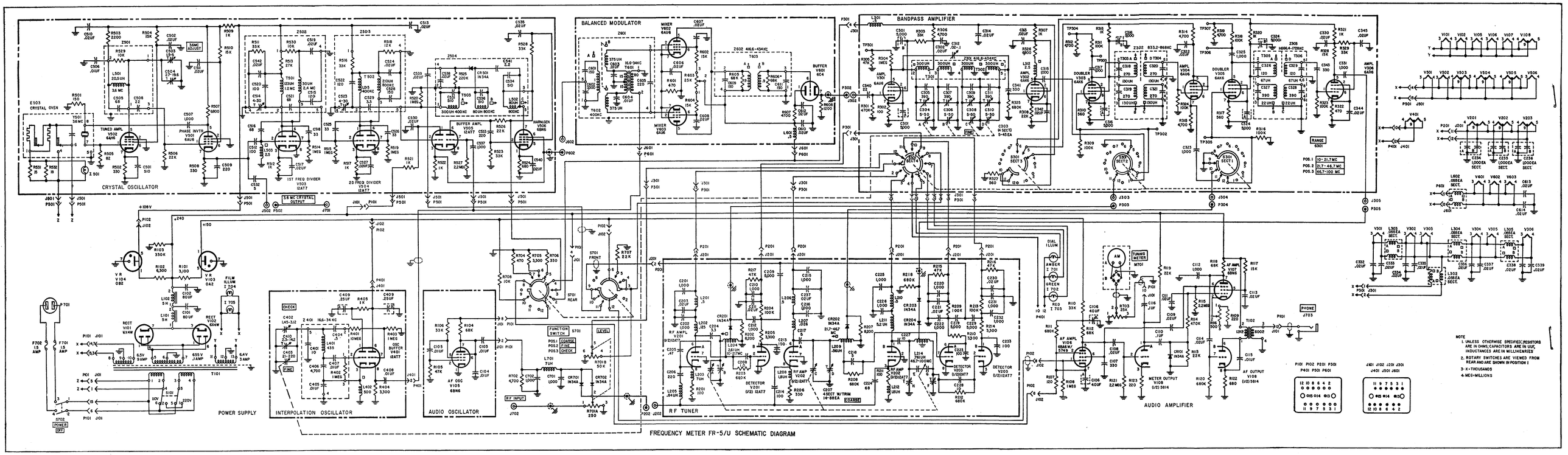
STEP 8 Rotate the COARSE tuning knob until the HARMONIC number found in Step 2 (number at top of column used) is under the hairline in the illuminated HARMONIC window of the COARSE tuning dial. A signal of the desired frequency is now available at the RF INPUT connector. Amplitude of this signal can be varied by means of the LEVEL control.

HARMONICS

BASIC FREQ.	24	25	26	27	28	29	30	31	32	33	34	35	36
416600	9.9984	10.4150	10.8316	11.2482	11.6648	12.0814	12.4980	12.9146	13.3312	13.7478	14.1644	14.5810	14.9976
603	.9985	.4151	.8317	.2483	.6649	.0815	.4981	.9147	.3313	.7479	.1645	.5811	.9977
606	.9985	.4152	.8318	.2484	.6650	.0816	.4982	.9148	.3314	.7480	.1646	.5812	.9978
609	.9986	.4152	.8318	.2484	.6651	.0817	.4983	.9149	.3315	.7481	.1647	.5813	.9979
612	.9987	.4153	.8319	.2485	.6651	.0817	.4984	.9150	.3316	.7482	.1648	.5814	.9980
416615	9.9988	10.4154	10.8320	11.2486	11.6652	12.0818	12.4985	12.9151	13.3317	13.7483	14.1649	14.5815	14.9981
618	.9988	.4155	.8321	.2487	.6653	.0819	.4985	.9152	.3318	.7484	.1650	.5816	.9982
621	.9989	.4155	.8321	.2488	.6654	.0820	.4986	.9153	.3319	.7485	.1651	.5817	.9984
624	.9990	.4156	.8322	.2488	.6655	.0821	.4987	.9153	.3320	.7486	.1652	.5818	.9985
627	.9990	.4157	.8323	.2489	.6656	.0822	.4988	.9154	.3321	.7487	.1653	.5819	.9986
416630	9.9991	10.4158	10.8324	11.2490	11.6656	12.0823	12.4989	12.9155	13.3322	13.7488	14.1654	14.5821	14.9987
633	.9992	.4158	.8325	.2491	.6657	.0824	.4990	.9156	.3323	.7489	.1655	.5822	.9988
636	.9993	.4159	.8325	.2492	.6658	.0824	.4991	.9157	.3324	.7490	.1656	.5823	.9989
639	.9993	.4160	.8326	.2493	.6659	.0825	.4992	.9158	.3324	.7491	.1657	.5824	.9990
642	.9994	.4161	.8327	.2493	.6660	.0826	.4993	.9159	.3325	.7492	.1658	.5825	.9991
416645	9.9995	10.4161	10.8328	11.2494	11.6661	12.0827	12.4994	12.9160	13.3326	13.7493	14.1659	14.5826	14.9992
648	.9996	.4162	.8328	.2495	.6661	.0828	.4994	.9161	.3327	.7494	.1660	.5827	.9993
651	.9996	.4163	.8329	.2496	.6662	.0829	.4995	.9162	.3328	.7495	.1661	.5828	.9994
654	.9997	.4164	.8330	.2497	.6663	.0830	.4996	.9163	.3329	.7496	.1662	.5829	.9995
657	.9998	.4164	.8331	.2497	.6664	.0831	.4997	.9164	.3330	.7497	.1663	.5830	.4997
416660	9.9998	10.4165	10.8332	11.2498	11.6665	12.0831	12.4998	12.9165	13.3331	13.7498	14.1664	14.5831	14.9998
663	.9999	.4166	.8332	.2499	.6666	.0832	.4999	.9166	.3332	.7490	.1665	.5832	.9999
666	10.0000	.4167	.8333	.2500	.6666	.0833	.5000	.9166	.3333	.7500	.1666	.5833	15.0000
669	.0001	.4167	.8334	.2501	.6667	.0834	.5001	.9167	.3334	.7501	.1667	.5834	.0001
672	.0001	.4168	.8335	.2501	.6668	.0835	.5002	.9168	.3335	.7502	.1668	.5835	.0002
416675	10.0002	10.4169	10.8336	11.2502	11.6669	12.0836	12.5003	12.9169	13.3336	13.7503	14.1670	14.5836	15.0003
678	.0003	.4170	.8336	.2503	.6670	.0837	.5003	.9170	.3337	.7504	.1671	.5837	.0004
681	.0003	.4170	.8337	.2504	.6671	.0837	.5004	.9171	.3338	.7505	.1672	.5838	.0005
684	.0004	.4171	.8338	.2505	.6672	.0838	.5005	.9172	.3339	.7506	.1673	.5839	.0006
687	.0005	.4172	.8339	.2505	.6672	.0839	.5006	.9173	.3340	.7507	.1674	.5840	.0007
416690	10.0006	10.4173	10.8339	11.2506	11.6673	12.0840	12.5007	12.9174	13.3341	13.7508	14.1675	14.5842	15.0008
693	.0006	.4173	.8340	.2507	.6674	.0841	.5008	.9175	.3342	.7509	.1676	.5843	.0009
696	.0007	.4174	.8341	.2508	.6675	.0842	.5009	.9176	.3343	.7510	.1677	.5844	.0011
699	.0008	.4175	.8342	.2509	.6676	.0843	.5010	.9177	.3344	.7511	.1678	.5845	.0012
702	.0008	.4176	.8343	.2510	.6677	.0844	.5011	.9178	.3345	.7512	.1679	.5846	.0013
416705	10.0009	10.4176	10.8343	11.2510	11.6677	12.0844	12.5012	12.9179	13.3346	13.7513	14.1680	14.5847	15.0014
708	.0010	.4177	.8344	.2511	.6678	.0845	.5012	.9179	.3347	.7514	.1681	.5848	.0015
711	.0011	.4178	.8345	.2512	.6679	.0846	.5013	.9180	.3348	.7515	.1682	.5849	.0016
714	.0011	.4179	.8346	.2513	.6680	.0847	.5014	.9181	.3348	.7516	.1683	.5850	.0017
717	.0012	.4179	.8346	.2514	.6681	.0848	.5015	.9182	.3349	.7517	.1684	.5851	.0018
416720	10.0013	10.4180	10.8347	11.2514	11.6682	12.0849	12.5016	12.9183	13.3350	13.7518	14.1685	14.5852	15.0019
723	.0014	.4181	.8348	.2515	.6682	.0850	.5017	.9184	.3351	.7519	.1686	.5853	.0020
726	.0014	.4182	.8349	.2516	.6683	.0851	.5018	.9185	.3352	.7520	.1687	.5854	.0021
729	.0015	.4182	.8350	.2517	.6684	.0851	.5019	.9186	.3353	.7521	.1688	.5855	.0022
732	.0016	.4183	.8350	.2518	.6685	.0852	.5020	.9187	.3354	.7522	.1689	.5856	.0024
416735	10.0016	10.4184	10.8351	11.2518	11.6686	12.0853	12.5021	12.9188	13.3355	13.7523	14.1690	14.5857	1.50025
738	.0017	.4185	.8352	.2519	.6687	.0854	.5021	.9189	.3356	.7524	.1691	.5858	.0026
741	.0018	.4185	.8353	.2520	.6687	.0855	.5022	.9190	.3357	.7525	.1692	.5859	.0027
744	.0019	.4186	.8353	.2521	.6688	.0856	.5023	.9191	.3358	.7526	.1693	.5860	.0028
747	.0019	.4187	.8354	.2522	.6689	.0857	.5024	.9192	.3359	.7527	.1694	.5861	.0029
416750	10.0020	10.4188	10.8355	11.2523	11.6690	12.0858	12.5025	12.9193	13.3360	13.7528	14.1695	14.5863	15.0030
753	.0021	.4188	.8356	.2523	.6691	.0858	.5026	.9193	.3361	.7528	.1696	.5864	.0031
756	.0021	.4189	.8357	.2524	.6692	.0859	.5027	.9194	.3362	.7529	.1697	.5865	.0032
759	.0022	.4190	.8357	.2525	.6693	.0860	.5028	.9195	.3363	.7530	.1698	.5866	.0033
762	.0023	.4191	.8358	.2526	.6693	.0861	.5029	.9196	.3364	.7531	.1699	.5867	.0034
416765	10.0024	10.4191	10.8359	11.2527	11.6694	12.0862	12.5030	12.9197	13.3365	13.7532	14.1700	14.5868	15.0035
768	.0024	.4192	.8360	.2527	.6695	.0863	.5030	.9198	.3366	.7533	.1701	.5869	.0036
771	.0025	.4193	.8360	.2528	.6696	.0864	.5031	.9199	.3367	.7534	.1702	.5870	.0038
774	.0026	.4194	.8361	.2529	.6697	.0864	.5032	.9200	.3368	.7535	.1703	.5871	.0039
777	.0026	.4194	.8362	.2530	.6698	.0865	.5033	.9201	.3369	.7536	.1704	.5872	.0040
416780	10.0027	10.4195	10.8363	11.2531	11.6698	12.0866	12.5034	12.9202	13.3370	13.7537	14.1705	14.5873	15.0041
783	.0028	.4196	.8364	.2531	.6699	.0867	.5035	.9203	.3371	.7538	.1706	.5874	.0042
786	.0029	.4197	.8364	.2532	.6700	.0868	.5036	.9204	.3372	.7539	.1707	.5875	.0043
789	.0029	.4197	.8365	.2533	.6701	.0869	.5037	.9205	.3372	.7540	.1708	.5876	.0044
792	.0030	.4198	.8366	.2534	.6702	.0870	.5038	.9206	.3373	.7541	.1709	.5877	.0045
416795	10.0031	10.4199	10.8367	11.2535	11.6703	12.0871	12.5039	12.9206	13.3374	13.7542	14.1710	14.5878	15.0046
798	.0032	.4200	.8367	.2535	.6703	.0871	.5039	.9207	.3375	.7543	.1711	.5879	.0047
801	.0032	.4200	.8368	.2536	.6704	.0872	.5040	.9208	.3376	.7544	.1712	.5880	.0048
804	.0033	.4201	.8369	.2537	.6705	.0873	.5041	.9209	.3377	.7545	.1713	.5881	.0049
807	.0034	.4202	.8370	.2538	.6706	.0874	.5042	.9210	.3378	.7546	.1714	.5882	.0051
416810	10.0034	10.4203	10.8371	11.2539	11.6707	12.0875	12.5043	12.9211	13.3379	13.7547	14.1715	14.5884	15.0052
813	.0035	.4203	.8371	.2540	.6708	.0876	.5044	.9212	.3380	.7548	.1716	.5885	.0053
816	.0036	.4204	.8372	.2540	.6708	.0877	.5045	.9213	.3381	.7549	.1717	.5886	.0054
819	.0037	.4205	.8373	.2541	.6709	.0878	.5046	.9214	.3382	.7550	.1718	.5887	.0055
822	.0037	.4206	.8374	.2542	.6710	.0878	.5047	.9215	.3383	.7551	.1719	.5888	.0056
416825	10.0038	10.4206	10.8375	11.2543	11.6711	12.0879	12.5048	12.9216	13.3384	13.7552	14.1721	14.5889	15.0057
828	.0039	.4207	.8375	.2544	.6712	.0880	.5048	.9217	.3385	.7553	.1722	.5890	.0058
831	.0039	.4208	.8376	.2544	.6713	.0881	.5049	.9218	.3386	.7554	.1723	.5891	.0059
834	.0040	.4209	.8377	.2545	.6714	.0882	.5050	.9219	.3387	.7555	.1724	.5892	.0060
837	.0041	.4209	.8378	.2546	.6714	.0883	.5051	.9219	.3388	.7556	.1725	.5893	.0061
416840	10.0042	10.4210	10.8378	11.2547	11.6715	12.0884	12.5052	12.9220	13.3389	13.7557	14.1726	14.5894	15.0062
843	.0042	.4211	.8379	.2548	.6716	.0084	.5053	.9221	.3390	.7558	.1727	.5895	.0063
846	.0043	.4212	.8380	.2548	.6717	.0085	.5054	.9222	.3391	.7559	.1728	.5896	.0065
849	.0044	.4212	.8381	.2549	.6718	.0886	.5055	.9223	.3392	.7560	.1729	.5897	.0066
852	.0044	.4213	.8382	.2550	.6719	.0887	.5056	.9224	.3393	.7561	.1730	.5898	.0067
416855	10.0045	10.4214	10.8382	11.2551	11.6719	12.0888	12.5057	12.9225	13.3394	13.7562	14.1731	14.5899	15.0068
858	.0046	.4215	.8383	.2552	.6720	.0889	.5057	.8226	.3395	.7563	.1732	.5900	.0069
861	.0047	.4215	.8384	.2552	.6721	.0890	.5058	.9227	.3396	.7564	.1733	.5901	.0070
864	.0047	.4216	.8385	.2553	.6722	.0891	.5059	.9228	.3396	.7565	.1734	.5902	.0071
867	.0048	.4217	.8385	.2554	.6723	.0891	.5060	.9229	.3397	.7566	.1735	.5903	.0072
416870	10.0049	10.4218	10.8386	11.2555	11.6724	12.0892	12.5061	12.9230	13.3398	13.7567	14.1736	14.5905	15.0073
873	.0050	.4218	.8387	.2556	.6724	.0893	.5062	.9231	.3399	.7568	.1737	.5906	.0074
876	.0050	.4219	.8388	.2557	.6725	.0894	.5063	.9232	.3400	.7569	.1738	.5907	.0075
879	.0051	.4220	.8389	.2557	.6726	.0895	.5064	.9232	.3401	.7570	.1739	.5908	.0076
882	.0052	.4221	.8389	.2558	.6727	.0896	.5065	.9233	.3402	.7571	.1740	.5909	.0078
416885	10.0052	10.4221	10.8390	11.2559	11.6728	12.0897	12.5066	12.9234	13.3403	13.7572	14.1741	14.5910	15.0079
888	.0053	.4222	.8391	.2560	.6729	.0898	.5066	.9235	.3404	.7573	.1742	.5911	.0080
891	.0054	.4223	.8392	.2561	.6729	.0898	.5067	.9236	.3405	.7574	.1743	.5912	.0081
894	.0055	.4224	.8392	.2561	.6730	.0899	.5068	.9237	.3406	.7575	.1744	.5913	.0082
897	.0055	.4224	.8393	.2562	.6731	.0900	.5069	.9238	.3407	.7576	.1745	.5914	.0083
416900	10.0056	10.4225	10.8394	11.2563	11.6732	12.0901	12.5070	12.9239	13.3408	13.7577	14.1746	14.5915	15.0084

1. For the FR-5A/U only make the following changes on the enclosed schematic diagram of the FR-5/U:

   a. FR-5/U should be FR-5A/U
   b. V305 should be changed from 6AK6 to 6AH6
   c. V106 should be changed from 6BA6W/5749 to 6AH6
   d. C240, 2.2 UUF should be added from pin 6 to pin 8 of V202
   e. C241, 0.51 UUF should be added from pin 1 to pin 3 of V202


CRYSTAL OSCILLATOR
BALANCED MODULATOR
BANDPASS AMPLIFIER
RF TUNER
AUDIO AMPLIFIER
INTERPOLATION OSCILLATOR
AUDIO OSCILLATOR
POWER SUPPLY
FREQUENCY METER FR-5/U SCHEMATIC DIAGRAM
NOTE
1. UNLESS OTHERWISE SPECIFIED, RESISTORS ARE IN OHMS, CAPACITORS ARE IN UUF, INDUCTANCES ARE IN MILLIHENRIES
2. ROTARY SWITCHES ARE VIEWED FROM REAR AND ARE SHOWN IN POSITION 1
3- K=THOUSANDS
4-MEG=MILLIONS